INSTALLATION RESTORATION PROGRAM
PHASE I: RECORDS SEARCH
WAKE ISLAND AIRFIELD

Prepared For

United States Air Force
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Tyndall AFB, Florida
and
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September 1984

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This report identified and evaluated potentially hazardous waste disposal sites at Wake Island Airfield. Records of past waste handling and disposal practices at the facilities were reviewed. Interviews with past and present installation employees were conducted to develop a history of waste disposal practices. The environmental setting for the area was summarized. Twelve sites at the installation were found to have potential to create environmantal contamination. These include a landfill, two burn areas (dumps), three liquid fuel areas, a fire protection training area, a scrap metal pile, two fuel leak areas, a shop area and the installation road system. Follow-on investigations (Phase II) were recommended and outlined.

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EXECUTIVE SUMMARY

The Department of Defense (DOD) has developed a program to identify and evaluate past hazardous material disposal sites on DOD property, to control the migration of hazardous contaminants, and to control hazards to health or welfare that may result from these past disposal operations. This program is called the Installation Restoration Program (IRP). The IRP has four phases consisting of Phase I, Installation Assessment/Records Search; Phase II, Confirmation/Quantification; Phase III, Technology Base Development; and Phase IV, Operations/Remedial Actions. Engineering-Science (ES) was retained by the United States Air Force to conduct the Phase I, Installation Assessment/Records Search for the Wake Island Airfield under Contract No. F08637 83 G0005 5001.

INSTALLATION DESCRIPTION

Wake Island Airfield is located approximately 2000 miles west of Honolulu, Hawaii. The installation is about 2600 acres in size. It has been under U.S. control since 1934, except for four years of Japanese occupation between 1941 and 1945. The Air Force has had jurisdictional responsibilities since 1972. The installation has primarily served as an emergency airfield and refueling stop for aircraft transiting the Pacific.

ENVIRONMENTAL SETTING

The environmental setting data reviewed for this investigation indicate several significant items relevant to the evaluation of past hazardous waste disposal and fuel handling practices at Wake Island Airfield:

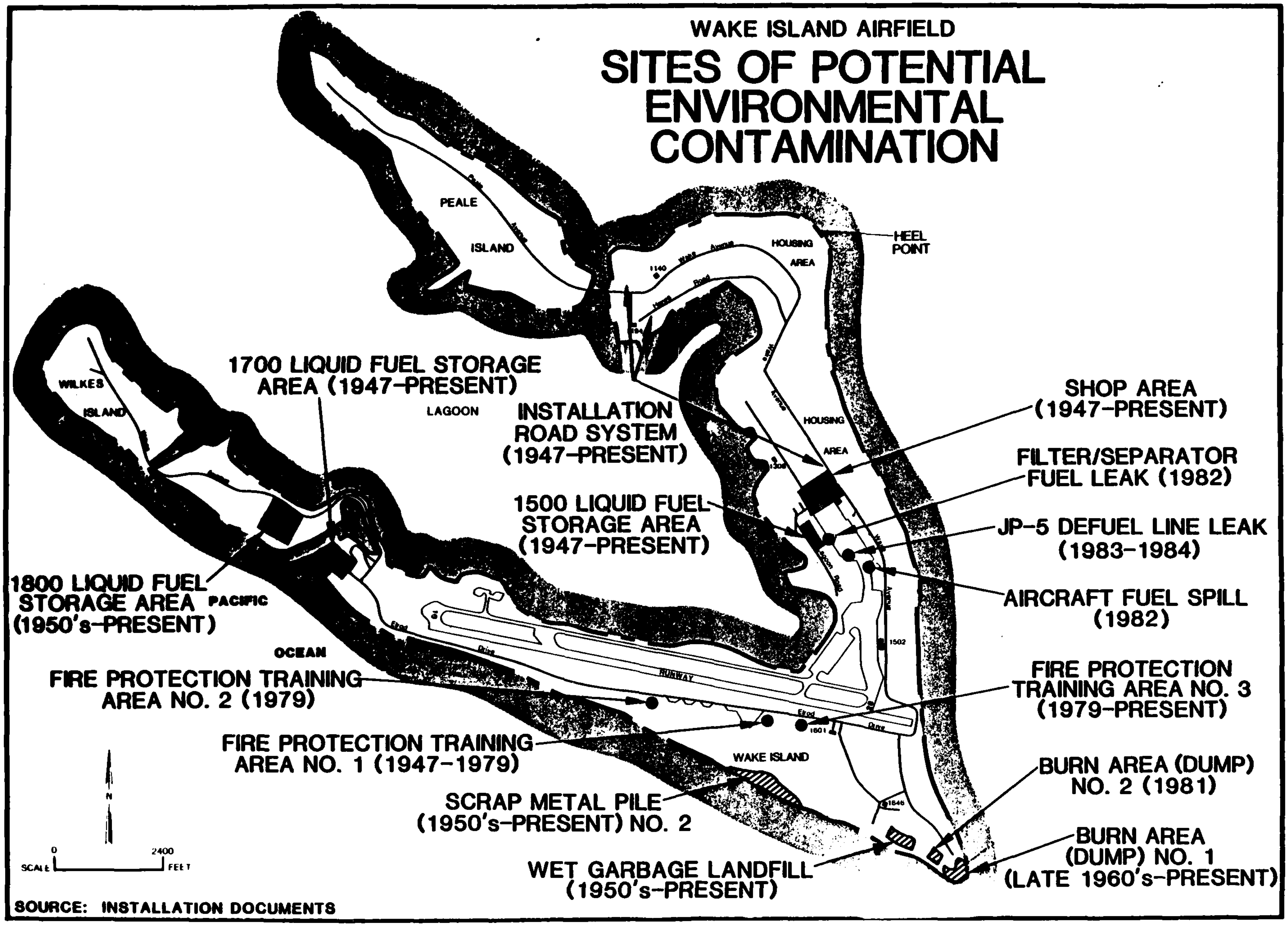
- Annual precipitation averages about 37 inches. Evapotranspiration is estimated at 6 inches per year.

- The surface soils at Wake Island are believed to be highly permeable.
- Shallow aquifers probably communicating with local surface waters are present at or near land surface. All facility operations are located in the recharge zone of the shallow aquifer.
- No threatened or endangered species inhabit Wake Island Airfield.
- Ground water is readily available to supply wells due to the sandy and coral geology. However, the ground water is brackish due to the close proximity to the ocean and the limited land mass available to develop fresh water lenses.
- Drinking water is provided by treating water collected on a catchment area or by a distillation plant supplied from deep brackish wells.

METHODOLOGY

During the course of this project, interviews were conducted with installation personnel (past and present) familiar with past waste disposal practices; file searches were performed for past hazardous waste activities; interviews were held with federal agencies; and field surveys were conducted at suspected past hazardous waste activity sites. Fifteen sites, shown in Figure 1, were initially identified as potentially containing hazardous contaminants resulting from past activities and having the potential for contaminant migration. The sites of potential environmental contamination at Wake Island Airfield have been assessed using a Hazard Assessment Rating Methodology (HARM) which takes into account factors such as site characteristics, waste characteristics, potential for contaminant migration and waste management practices. The details of the rating procedure are presented in Appendix G and the results of the assessment are given in Table 1. The rating system is designed to indicate the relative need for follow-on investigation.

FIGURE 1



SOURCE: INSTALLATION DOCUMENTS

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TABLE 1
SITES EVALUATED USING THE HAZARD ASSESSMENT RATING METHODOLOGY
AT WAKE ISLAND AIRFIELD

Rank	Site	Operation Period	HARM Score (1)
1	Shop Area	1947-Present	73
2	Installation Road System	1947-Present	73
3	1800 Liquid Fuel Storage Area	1950's-Present	70
4	1700 Liquid Fuel Storage Area	1947-Present	70
5	1500 Liquid Fuel Storage Area	1947-Present	69
6	Scrap Metal Pile No. 2	1950's-Present	68
7	Filter/Separator No. 6 Leak	1982	66
8	JP-5 Defuel Line Leak	1983-1984	64
9	Fire Protection Training Area No. 1	1947-1979	63
10	Burn Area (Dump) No. 1	1960's-Present	56
11	Burn Area (Dump) No. 2	1981	56
12	Landfill	1950's-Present	56
13	Aircraft Fuel Spill	1982	55
14	Fire Protection Training Area No. 2	1979	53
15	Fire Protection Training Area No. 3	1979-Present	50

(1) This ranking was obtained using the Hazard Assessment Rating Methodology (HARM) described in Appendix G. Individual rating forms are in Appendix H.

FINDINGS AND CONCLUSIONS

The following conclusions have been developed based on the results of the field inspection, reviews of installation records and files, interviews with installation personnel, and evaluations using the HARM system.

The areas found to have sufficient potential to create environmental contamination are as follows:

- o Shop Area
- o Installation Road System
- o 1800 Liquid Fuel Storage Area
- o 1700 Liquid Fuel Storage Area
- o 1500 Liquid Fuel Storage Area
- o Scrap Metal Pile No. 2
- o Filter/Separator No. 6 Leak
- o JP-5 Defuel Line Leak
- o Fire Protection Training Area No. 1
- o Burn Area (Dump) No. 1
- o Burn Area (Dump) No. 2
- o Landfill

The areas judged to have minimal potential to create environmental contamination are as follows:

- o Aircraft Fuel Spill
- o Fire Protection Training Area No. 2
- o Fire Protection Training Area No. 3

RECOMMENDATIONS

Recommended guidelines for future land use restrictions at the various potential contamination sites are presented in Section 6. A program for proceeding with Phase II of the IRP at Wake Island Airfield is also discussed in Section 6. The recommended actions include soil borings, monitoring wells, and a sampling and analysis program to determine if contamination exists. This would be expanded to define the extent and type of contamination if the initial step reveals site

TABLE 2
RECOMMENDED MONITORING PROGRAM FOR PHASE II
IRP AT WAKE ISLAND AIRFIELD

Site (Rating Score)	Recommended Monitoring Program	Comments
Shop Area (73)	Obtain samples from four soil borings within shop area. Samples should be collected from surface and a 3-foot depth. Analyze the samples for the parameters in Table 6.2, List B-1. Install and sample four monitoring wells including one well on northwestern side of Wake Avenue. The latter well can be eliminated if the brackish well at Facility 603 can be sampled. The samples collected from the wells should be analyzed for the parameters in Table 6.2, List B-2.	Continue monitoring if sampling indicates contamination. Additional monitoring wells may be necessary to assess extent of the contamination. soil sampling at additional locations and at greater depths may be required if contamination is found.
Installation Road System (73)	Obtain samples from six soil borings and three control borings in areas where roads have been oiled relatively recently. Samples should be collected at the surface and at 3 feet below the ground surface. Analyze the samples for parameters in Table 6.2, List C-1. If contamination is determined to be significant, then expand the sampling program.	Collect samples from additional locations and at greater depths if contamination is found.
1800 Liquid Fuel Storage Area (70)	Sample existing well (Facility 1807) or install and sample a monitoring well west of storage area and two additional wells north and south of the storage area. Analyze samples for parameters in Table 6.2, List A-2. Collect soil samples from surface and at a depth of 3 feet from five soil borings in area. Analyze samples for parameters in Table 6.2, List A-1.	Continue monitoring if sampling indicates contamination. Additional monitoring wells may be necessary to assess extent of the contamination.
1700 Liquid Fuel Storage Area (70)	Install three monitoring wells and five soil borings. Collect samples from the wells and soil borings (at the surface and 3 feet below ground surface) and analyze samples for parameters listed in Table 6.2, Lists A-1 and A-2 for soil samples and water samples, respectively.	Continue monitoring if sampling indicates contamination. Additional monitoring wells may be necessary to assess extent of the contamination.

TABLE 2 (Continued)
RECOMMENDED MONITORING PROGRAM FOR PHASE II
IRP AT WAKE ISLAND AIRFIELD

Site (Rating Score)	Recommended Monitoring Program	Comments
1500 Liquid Fuel Storage Area (69) Filter/Separator No. 6 Fuel Leak (66) and Defuel Line Leak (64)	Collect soil samples at the ground surface and at a depth of 3 feet from four soil borings in the fuel storage area and two borings at the location of the filter/separator fuel leak. Analyze the soil samples for the parameters in Table 6.2, List A-1. Install three monitoring wells, including one near the JP-5 fuel leak, one east of the storage area and one between the storage area and the lagoon. Analyze water samples for parameters in Table 6.2, List A-2.	These sites have been combined due to close proximity and similar type of potential contaminants. Additional monitoring wells may be required if contamination is found.
Scrap Metal Pile No. 2 (68)	Install and sample two monitoring wells. Analyze the water samples for the parameters listed in Table 6.2, List D-2. Obtain samples from four soil borings and analyze the samples for the parameters listed in Table 6.2, List D-1. Soil samples should be obtained from the ground surface and from a depth of 3 feet.	Continue monitoring if sampling indicates contamination. Additional monitoring wells may be necessary to assess extent of the contamination. Soil sampling at additional locations and at greater depths may be required if contamination is found.
Fire Protection Training Area No. 1 (56)	Sample existing wells at Facilities 1601 and 1606, and install monitoring well at the site. Analyzewater samples for parameters listed in Table 6.2, List D-2. Collect soil samples at the surface, and at 3 feet below the ground surface, and analyze for the parameters listed in Table 6.2, List D-1.	Continue monitoring if sampling indicates contamination. Additional monitoring wells may be necessary to assess extent of the contamination. Soil sampling at additional locations and at greater depths may be required if contamination is found.
Landfill (56)	Install a well northeast and a well southwest of the landfill. Collect water samples from the wells and analyze for parameters listed in Table 6.2, List E-2. No sampling of soils in this area is recommended.	Continue monitoring if sampling indicates contamination. Additional monitoring wells may be necessary to assess extent of the contamination. Soil sampling at additional locations and at greater depths may be required if contamination is found.
Burn Area (Dump) No. 1 and and Burn Area (Dump) No. 2 (56)	Collect samples from five soil borings. One of the soil borings should be located near the wastewater treatment plant. Two borings should be located in each of the burn areas. Soil samples should be collected from the surface and at 3-feet (depth) and analyzed for the parameters in Table 6.2, List E-1.	These two sites have been combined due to close proximity and similarity of wastes disposed of at the sites. Monitoring wells may be required if contamination is found in soil samples to more fully characterize the nature and extent of the contamination.

Source: Engineering-Science.

SECTION 1
INTRODUCTION

BACKGROUND AND AUTHORITY

The United States Air Force, due to its primary mission of defense of the United States, has long been engaged in a wide variety of operations dealing with toxic and hazardous materials. Federal, state, and local governments have developed strict regulations to require that disposers identify the locations and contents of past disposal sites and take action to eliminate hazards in an environmentally responsible manner. The primary Federal legislation governing disposal of hazardous waste is the Resource Conservation and Recovery Act (RCRA) of 1976, as amended. Under Section 6003 of the Act, Federal agencies are directed to assist the Environmental Protection Agency (EPA) and under Section 3012, state agencies are required to inventory past disposal sites, and Federal agencies are required to make the information available to the requesting agencies. To assure compliance with these hazardous waste regulations, the Department of Defense (DOD) developed the Installation Restoration Program (IRP). The current DOD IRP policy is contained in Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5, dated 11 December 1981 and implemented by Air Force message dated 21 January 1982. DEQPPM 81-5 reissued and amplified all previous directives and memoranda on the Installation Restoration Program. DOD policy is to identify and fully evaluate suspected problems associated with past hazardous contamination, and to control hazards to health and welfare that resulted from these past operations. The IRP is the basis for response actions on Air Force installations under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, clarified by Executive Order 12316. CERCLA is the primary legislation governing remedial action at past hazardous waste disposal sites.

PURPOSE AND SCOPE

The Installation Restoration Program is a four-phased program (Figure 1.1) designed to assure that identification, confirmation/quantification and remedial actions are performed in a timely and cost-effective manner. Each phase is briefly described below:

- Phase I - Installation Assessment/Records Search - Phase I is to identify and prioritize those past disposal sites that may pose a hazard to public health or the environment as a result of contaminant migration to surface or ground waters, or have an adverse effect by its persistence in the environment. In this phase, it is determined whether a site requires further action to confirm an environmental hazard or whether it may be considered to present no hazard at this time. If a site requires immediate remedial action, such as removal of abandoned drums, the action can proceed directly to Phase IV. Phase I is a basic background document for the Phase II study.
- Phase II - Confirmation/Quantification - Phase II is to define and quantify, by preliminary and comprehensive environmental and/or ecological survey, the presence or absence of contamination, the extent of contamination, waste characterization (when required by the regulatory agency), and to identify sites or locations where remedial action is required in Phase IV. Research requirements identified during this phase will be included in the Phase III effort of the program.
- Phase III - Technology Base Development - Phase III is to develop a sound data base upon which to prepare a comprehensive remedial action plan. This phase includes implementation of research requirements and technology for objective assessment of adverse effects. A Phase III requirement can be identified at any time during the program.
- Phase IV - Operations/Remedial Actions - Phase IV includes the preparation and implementation of the remedial action plan.

Engineering-Science (ES) was retained by the United States Air Force to conduct the Phase I Records Search at Wake Island Airfield

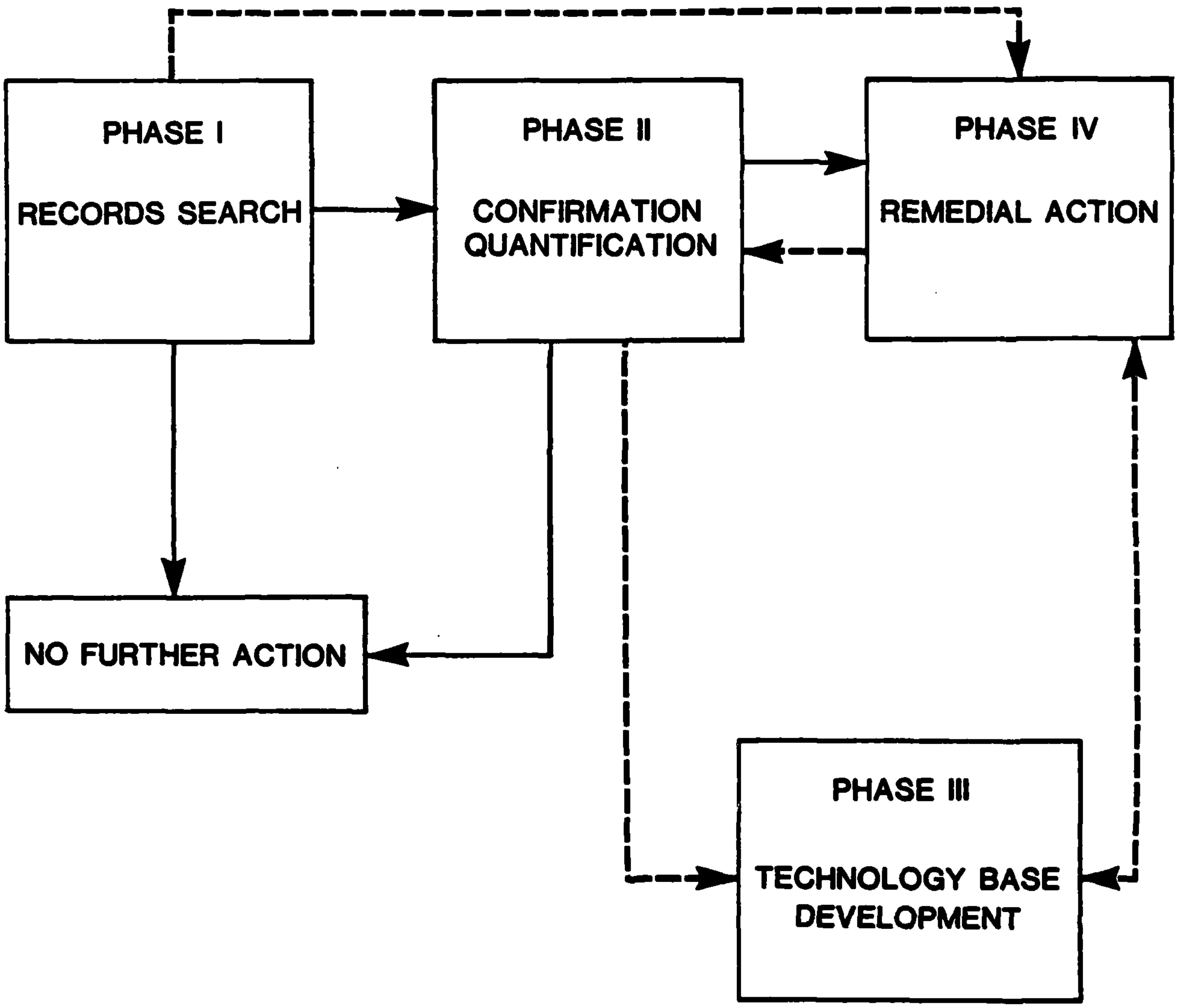


FIGURE 1.1 INSTALLATION RESTORATION PROGRAM

SOURCE: AFESC

under Contract No. F08637 83 G0005 5001. This report contains a summary and an evaluation of the information collected during Phase I of the IRP and recommended follow-on actions. The Wake Island Airfield study included a total of 2600 acres, consisting of Wake, Peale and Wilkes Islands. The activities performed as a part of the Phase I study scope included the following:

- Review of site records
- Interviews with personnel familiar with past generation and disposal activities
- Survey of types and quantities of wastes generated
- Determination of current and past hazardous waste treatment, storage, and disposal activities
- Description of the environmental setting at the installation
- Review of past disposal practices and methods
- Reconnaissance of field conditions
- Collection of pertinent information from federal agencies
- Assessment of the potential for contaminant migration
- Development of recommendations for follow-on actions

ES performed the on-site portion of the records search during May, 1984. The following team of professionals were involved:

- R. L. Thoem, Environmental Engineer and Project Manager, MS Sanitary Engineering, 21 years of professional experience in environmental engineering.
- J. R. Absalon, Hydrogeologist, BS Geology, 10 years of professional experience in geology and ecology.
- R. M. Palazzolo, Environmental Engineer, MS Environmental Engineering, 3 years of professional experience in environmental engineering.

More detailed information on these three individuals is presented in Appendix A.

METHODOLOGY

The methodology utilized in the Wake Island Airfield Records Search began with a review of past and present industrial operations conducted at the installation. Information was obtained from available records such as shop files and real property files, as well as interviews with 46 past and present installation employees from various operating areas. Those interviewed included current and past personnel associated with civil engineering, bioenvironmental engineering, fuels management, communications, entomology, supply, motor pool, maintenance, real property, recreation, contractors, and interservice support. A listing of interviewee positions with approximate years of service is presented in Appendix B.

Concurrent with the installation interviews, the applicable federal agencies were contacted. The U.S. Geological Survey, Water Resources Division (Honolulu, HI) was able to supply some information.

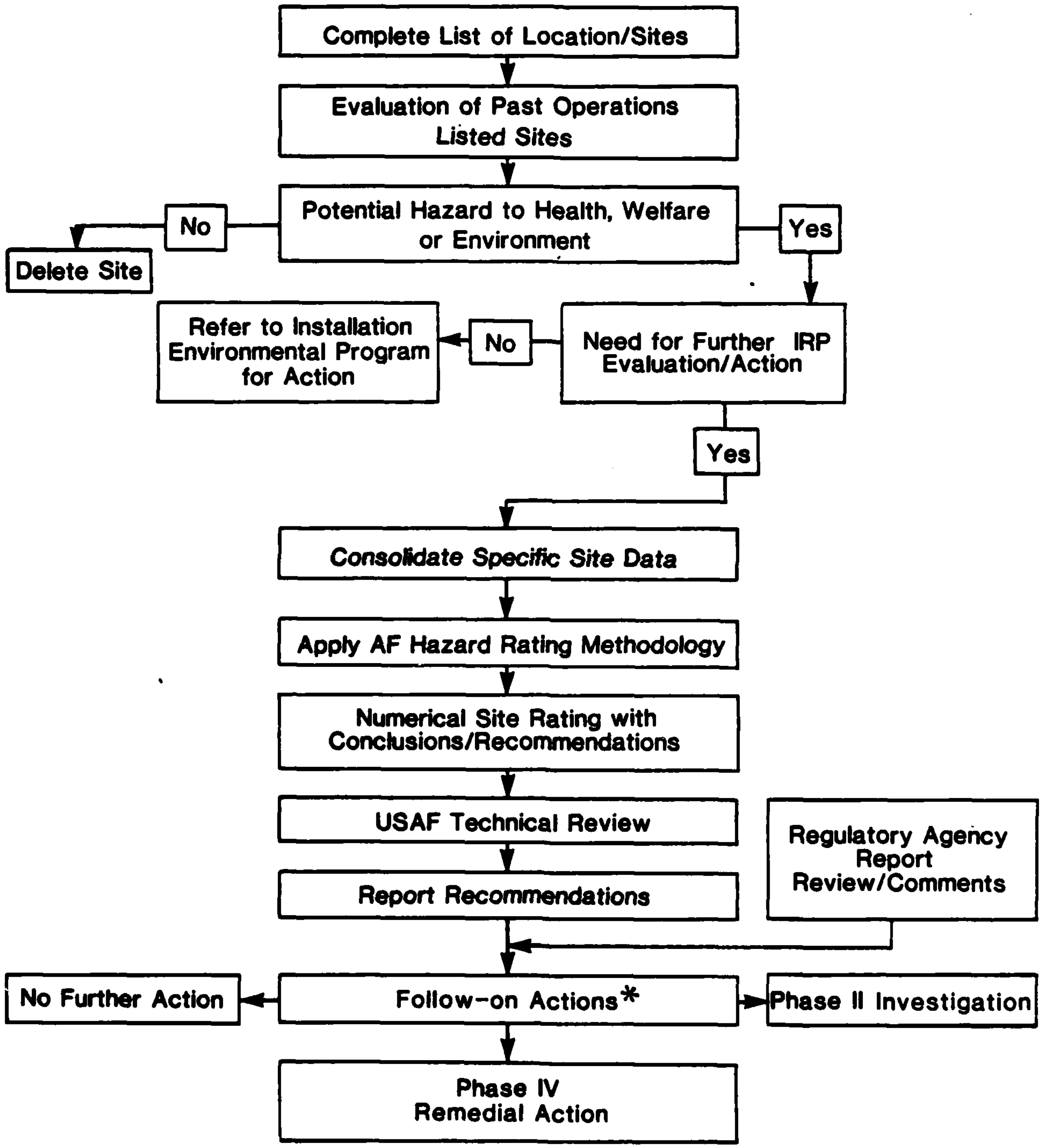
The next step in the activity review was to identify all sources of hazardous waste generation and to determine the past management practices regarding the use, storage, treatment, and disposal of hazardous materials from the various sources on the installation. Included in this part of the activities review was the identification of all known past disposal sites and other possible sources of contamination such as spill or leak areas.

Due to the remote location of the site, a general ground tour, instead of a helicopter overflight, was made to gather site-specific information including: (1) general observations of existing site conditions; (2) visual evidence of environmental stress; (3) presence of nearby drainage ditches or surface waters; and (4) visual inspection of these water bodies for any obvious signs of contamination or leachate migration.

A decision was then made, based on all of the above information, whether a potential hazard exists to health, welfare or the environment at any of the identified sites using the Flow Chart shown in Figure 1.2. If no potential existed, the site was deleted from further consideration. For those sites where a potential hazard was identified, a determination of the need for IRP evaluation/action was made by considering site-specific conditions. If no further IRP evaluation was determined

PHASE I INSTALLATION RESTORATION PROGRAM

RECORDS SEARCH FLOW CHART



*Beyond Scope of Phase I

Source: AFESC

necessary, then the site was referred to the installation environmental program for appropriate action. If a site warranted further investigation, it was evaluated and rated using the Hazard Assessment Rating Methodology (HARM). The HARM score indicates the relative potential for adverse effects on health or the environment at each site evaluated.

SECTION 2

INSTALLATION DESCRIPTION

LOCATION, SIZE AND BOUNDARIES

Wake Island Airfield is located in the Pacific Ocean over 2000 miles west of Honolulu, Hawaii (Figure 2.1). The Wake Island installation consists of three closely located islands including Wake, Wilkes and Peale. The total 2600 acres formed by these three islands are owned by the Air Force. Figure 2.2 shows the Wake Island installation. The runway, industrial shops, housing and fuel storage facilities are located on Wake Island. The eastern portion of Wilkes Island is used for additional fuel storage facilities and the western part is a bird sanctuary. Peale Island is used for recreational purposes.

HISTORY

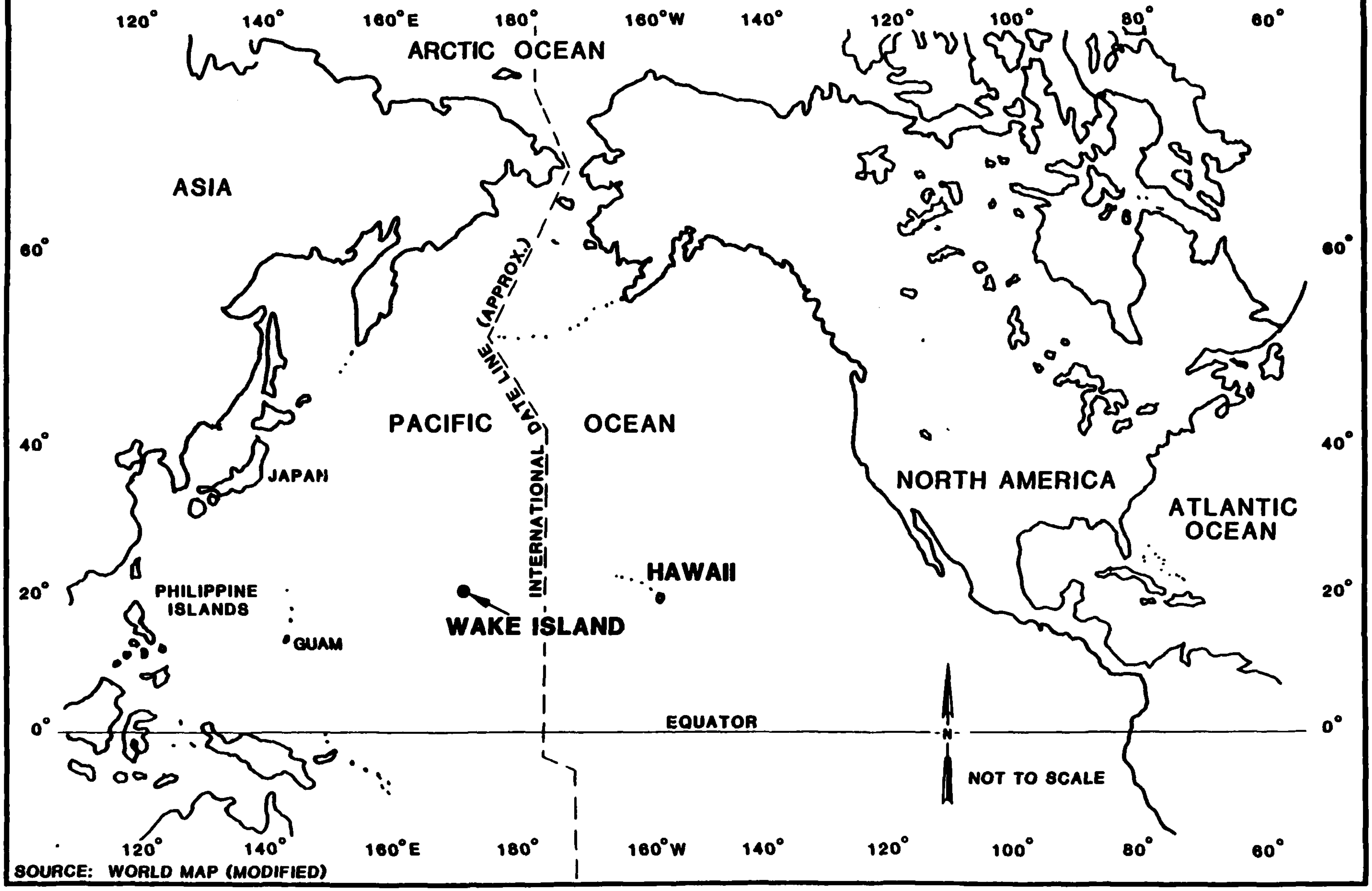
The United States Navy exercised jurisdiction over Wake Island from 1934 to 1947, except for the period between December, 1941 and September, 1945 when a Japanese task force captured and occupied the island. From 1947 to 1972, the Federal Aviation Administration (FAA) had jurisdictional responsibility for Wake Island. During this period contractors for the Military Airlift Transport Services (MATS) [predecessor organization of the Military Airlift Command (MAC)] serviced transient Air Force aircraft at Wake Island.

Detachments of the 6486th Air Base Wing (predecessor organization of the 15th Air Base Wing) provided various types of support, for example, liaison in procurement matters, minor construction projects, and fire fighting training from 1962 to 1966.

From 1972 to 1973, the Military Airlift Command had responsibility for Wake. In July, 1973 Detachment 4 of the 15th Air Base Wing assumed host responsibility at Wake including Base Operating Support (BOS) contract monitoring functions.

FIGURE 2.1

REGIONAL LOCATION



SOURCE: WORLD MAP (MODIFIED)

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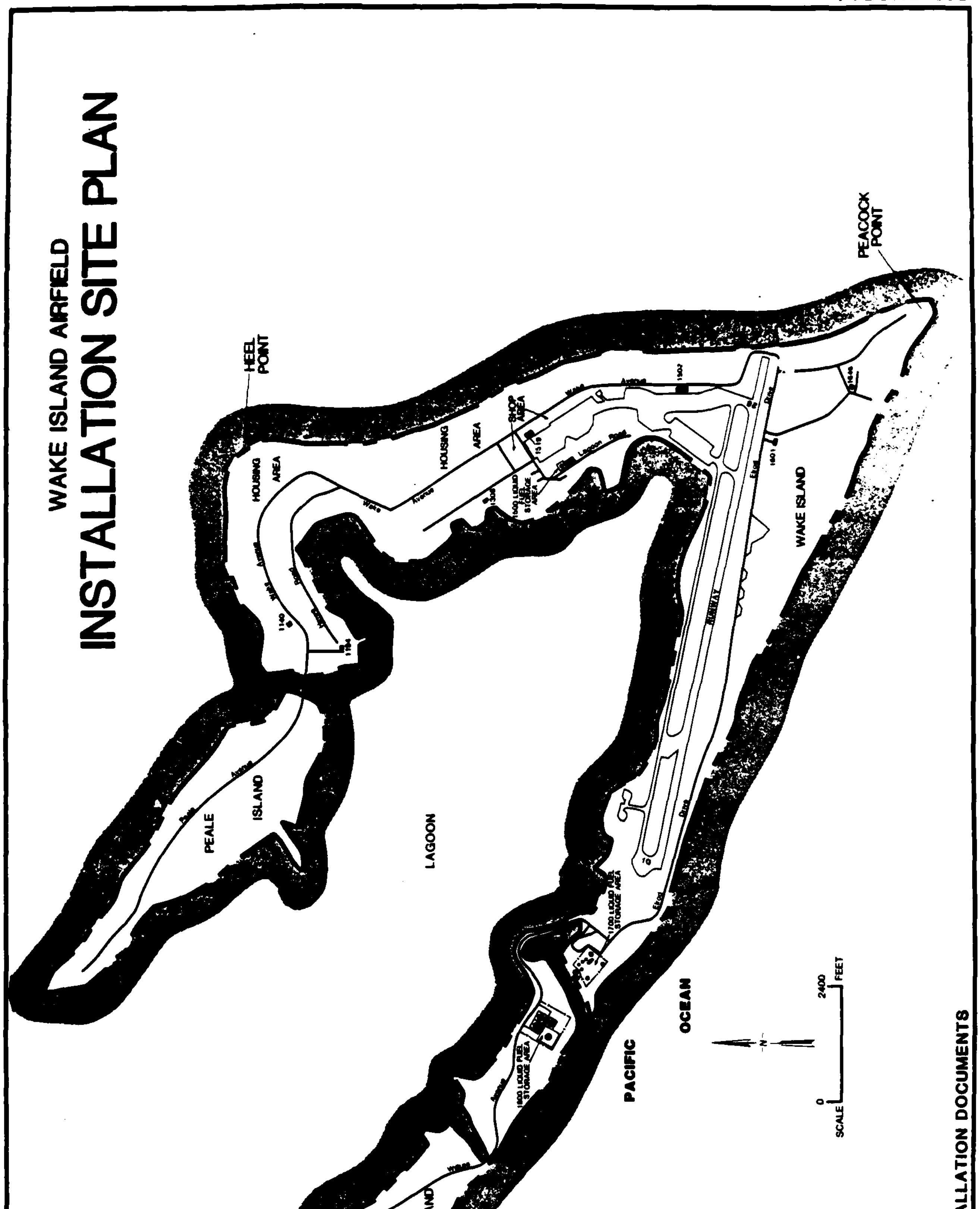
WAKE ISLAND AIRFIELD
INSTALLATION SITE PLAN
HEEL POINT
HOUSING AREA
HOUSING AREA
SHOP AREA
1600 LIQUID FUEL STORAGE AREA
PEACOCK POINT
WAKE ISLAND
PEALE ISLAND
LAGOON
1700 LIQUID FUEL STORAGE AREA
1800 LIQUID FUEL STORAGE AREA
WILKES ISLAND
PACIFIC OCEAN
N
SCALE 0 2400 FEET
SOURCE: INSTALLATION DOCUMENTS

ORGANIZATION AND MISSION

The host unit at Wake Island is Detachment 4, 15th ABW. The primary mission is in support of any contingency operations in PACOM, such as aiding in the relocation of military forces. Wake Island serves primarily as an emergency airfield and refueling stop for aircraft transiting the Pacific. The island is currently in caretaker status until such time as there may be contingency operations. The airfield is maintained by a Base Operating Support (BOS) contractor. The Detachment Commander serves as the quality assurance evaluator to monitor and insure proper performance by the contractor. Detachment 4, 15th ABW is host to two tenants; the National Weather Service, NOAA, and Transpacific Cable Company. Descriptions of these tenants and their missions are presented in Appendix C.

SECTION 3
ENVIRONMENTAL SETTING

The environmental setting of Wake Island Airfield is briefly described in this section. The primary emphasis is directed toward the identification of features that may facilitate the migration of hazardous waste contaminants from the installation. Environmentally sensitive conditions pertinent to the study are highlighted as much as possible considering the relatively limited data available.

METEOROLOGY

Wake Island precipitation is reported to average 37 inches annually. The intensity of a one-year, 24-hour storm is estimated to be 15 inches. This high value suggests a strong erosion potential. No data is available to describe local evapotranspiration, runoff and recharge rates. The evapotranspiration is estimated to be 6 inches, based on an estimate of evaporation from the water catchment area. Due to the generally level atoll topography, it may be reasonably assumed that most rainfall not consumed by evapotranspiration is able to infiltrate into surface soils in unpaved areas.

TOPOGRAPHY

Wake Island is a partially-raised atoll. Wake actually consists of three motus (islands) arranged in a triangular fashion around a submerged volcanic cone with a shallow lagoon at the approximate center. The three motus are identified as Wake, Wilkes and Peale Islands and are surrounded by a coral reef. The islands slope gently from maximum surface elevations of 21 feet MSL (Wake and Peale) and 18 feet MSL (Wilkes) to the sea. Their general surface expression is that of a level area with the ocean forming the most prominent spatial variation. The lagoon averages ten feet in depth. Beach areas are sandy with loose coral blocks on shore.

DRAINAGE

Most rainfall occurring within the 1100 Air Force housing area and runway areas is collected by diversion structures and directed to the adjacent lagoon or to the Pacific Ocean. Because of its generally low topographic setting, precipitation occurring in undeveloped and abandoned areas simply follows local topography to adjacent surface waters. Figure 3.1 depicts major installation surface drainage features.

SOILS

The soils of Wake Island and its associated motus have not been mapped by a modern soil survey. A study area reconnaissance suggests that the predominant natural soil is a thin veneer of organic materials (where extensive vegetative growth has developed) overlying sand and coral. Most of the paved areas are underlain by either sand or coral block fill.

GEOLOGY

Wake Island is an atoll consisting of three distinct land masses that have formed largely by coral growth around the rim of a submerged caldera. Sand and limestone have accumulated within the zone sheltered by the fringing reef complex to depths of more than 200 feet, as indicated by the logs of installation water wells. The island's typical geologic profile consists of alternating layers of sand, shells, coral and soft limestone, frequently mixed. Low areas proximate to the lagoon may also have varying thicknesses of organic soils present, which are associated with the decay of island vegetation.

GROUND-WATER RESOURCES

Wake Island possesses very limited ground-water resources due to its small land mass and its subdued topography. The source of local ground water is precipitation falling on permeable sand and coral areas and subsequently infiltrating into the subsurface. Ground water is contained in the very permeable sands and corals at shallow depths (usually ten feet below grade or less) and discharges either to the sea or to the lagoon. It is believed that the ground-water divide which

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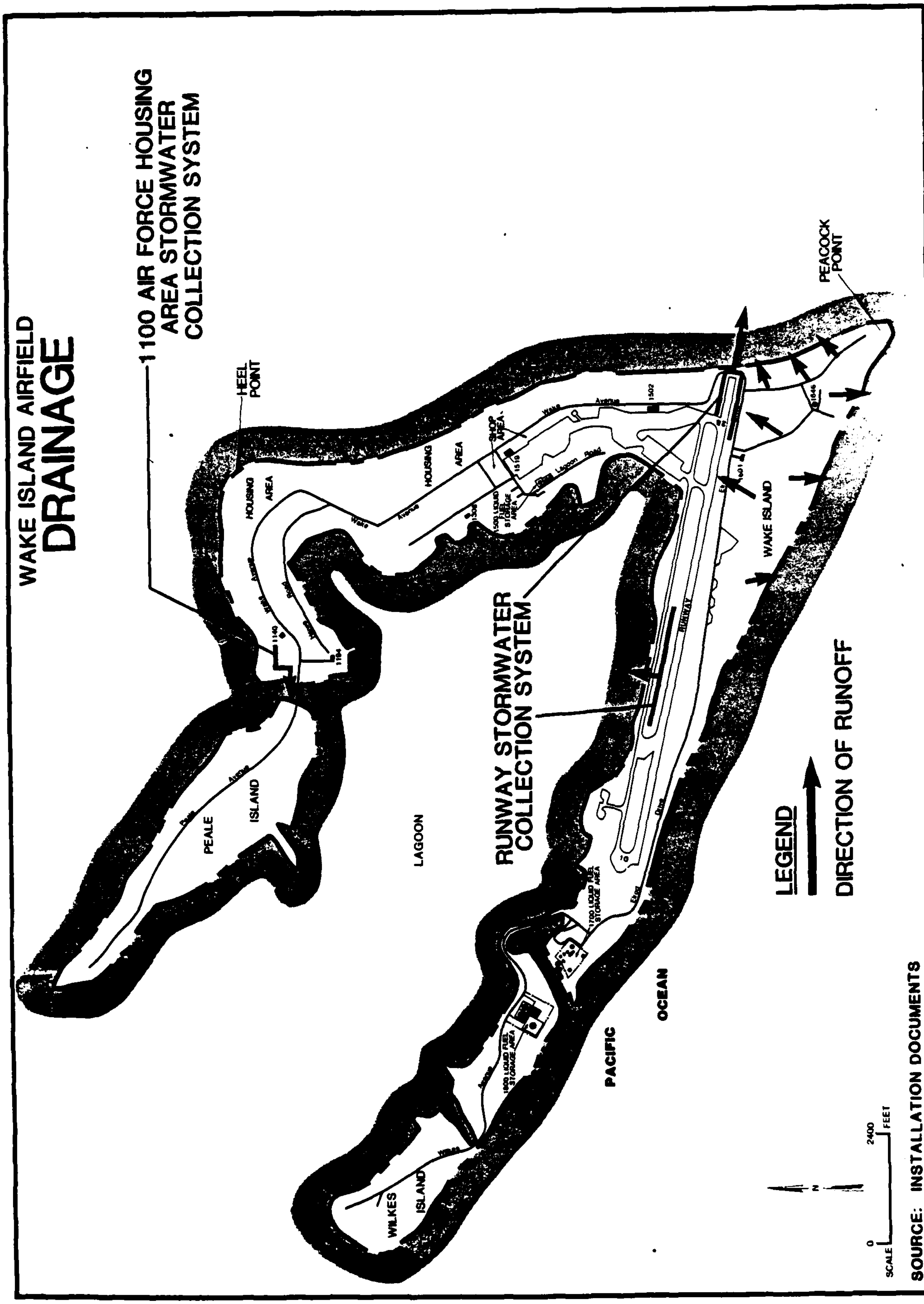
FIGURE 3.1



WAKE ISLAND AIRFIELD
DRAINAGE
1100 AIR FORCE HOUSING AREA STORMWATER COLLECTION SYSTEM
RUNWAY STORMWATER COLLECTION SYSTEM
HEEL POINT
PEACOCK POINT
HOUSING AREA
HOUSING AREA
SHOP AREA
PEALE ISLAND
LAGOON
WAKE ISLAND
RUNWAY
PACIFIC OCEAN
WILKES ISLAND
1700 LIQUID FUEL STORAGE AREA
1600 LIQUID FUEL STORAGE AREA
LEGEND
DIRECTION OF RUNOFF
SCALE 0 2400 FEET
N
SOURCE: INSTALLATION DOCUMENTS

separates areas of differing flow directions corresponds to topographic highs of the motus.

Substantial thicknesses of sand and coral exist below the island's land surface and readily give up water to wells. The water, however, is brackish, due to the close proximity of the sea, local ground water's direct connection to the ocean and the fact that the limited land mass precludes the development of a sizable fresh-water lens from which good quality water supplies may be drawn. Figure 3.2 is the log of a deep well (200 feet) which depicts hydrogeologic conditions typical of Wake Island. At present, ground-water resources are utilized at Wake Island to provide supplies to the desalinization and power plants, to provide water to operate local septic systems and to provide fire protection sources. The location of Wake Island's nine currently used water wells are shown on Figure 3.3.

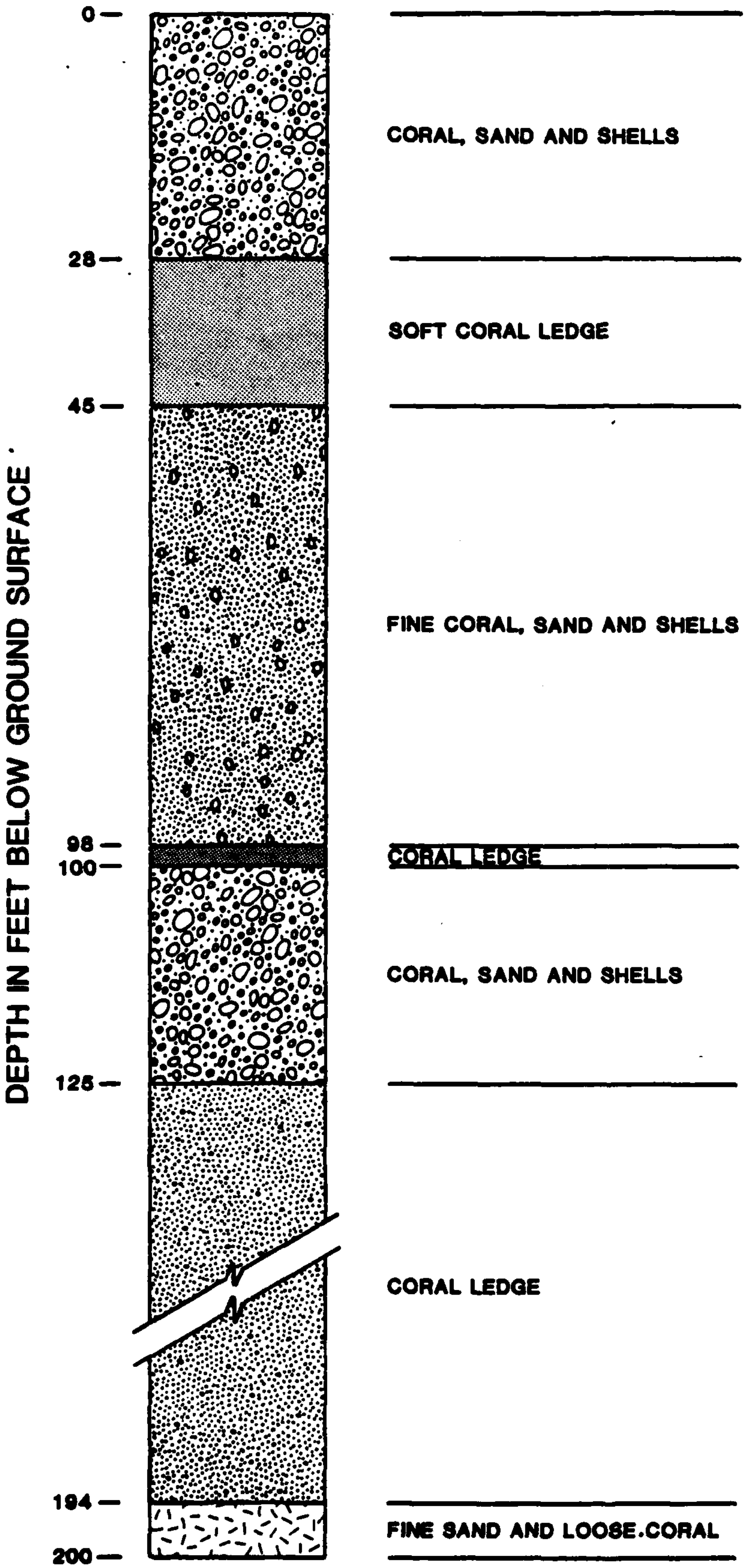
GROUND-WATER QUALITY

The Wake Island facility obtains its water supplies from a 35-acre rain catchment area. Water collected by this means is treated and stored for use as needed. Additional supplies may be obtained from a distillation plant which draws brackish ground water from three deep wells screened into sand and coral sediment zones beneath the motu. The quality of water collected from the catchment area is generally of good quality, however, some complaints concerning the color and taste of this water were noted during calendar year 1983. Distillation plant water quality is also reported to be acceptable. The integrity of water supply distribution lines may be somewhat questionable. Water testing along several sections of the distribution system's pipeline indicate marked changes in pH. This could indicate leakage or infiltration of local ground water into the water distribution system. The system's integrity should be checked frequently or at least annually as portions of it pass through areas where septic tank use is now or was formerly, common.

FIGURE 3.2

WAKE ISLAND AIRFIELD

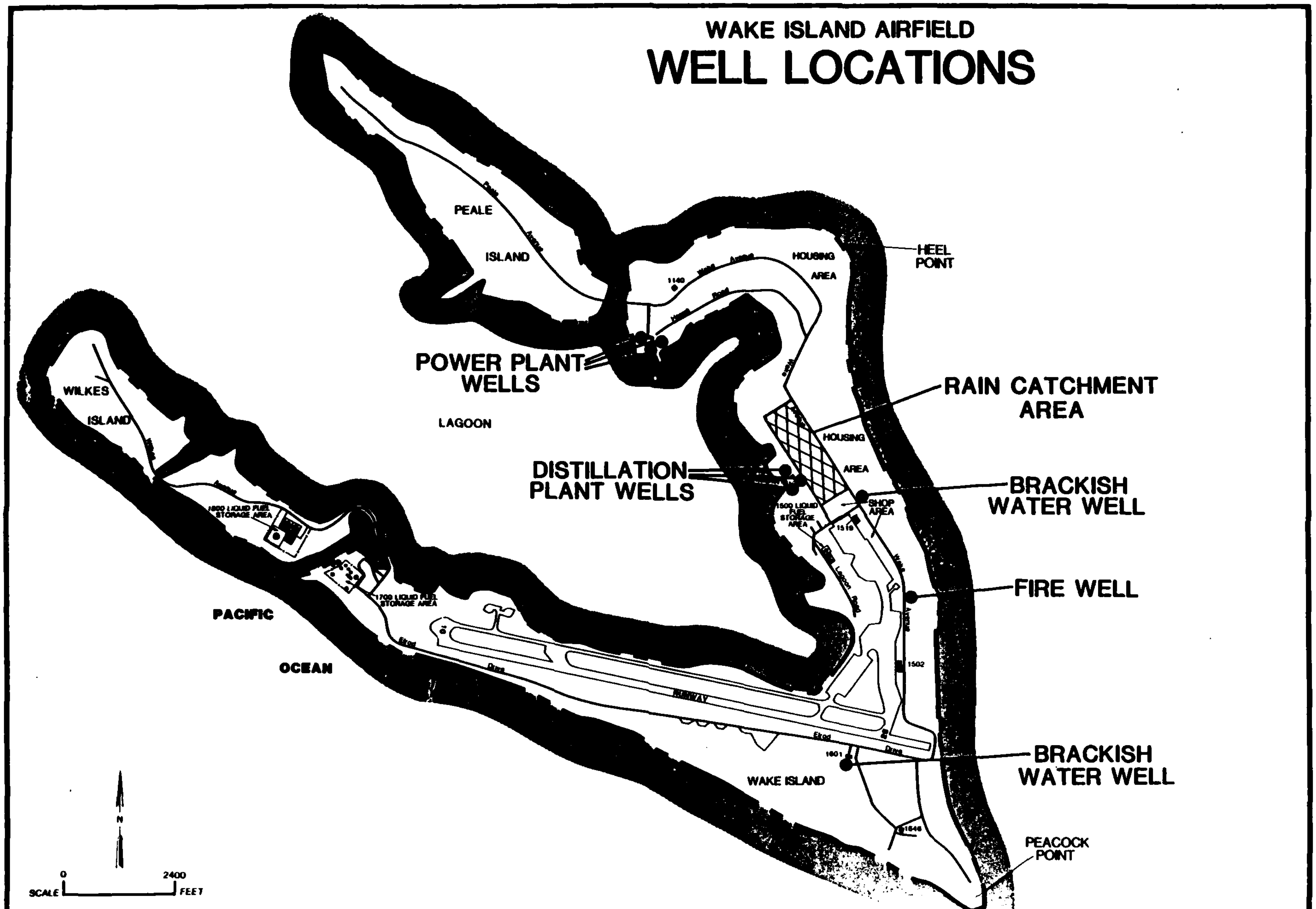
DEEPWELL NO. 3 AT POWER PLANT



SOURCE: INSTALLATION DOCUMENTS

NOTE: WATER LEVEL NOT RECORDED

FIGURE 3.3



SOURCE: INSTALLATION DOCUMENTS

SURFACE WATER

The surface waters at Wake Island Airfield are the Pacific Ocean and the lagoon formed by the three islands, Wake, Peale and Wilkes. These surface waters are unclassified as regards quality or use.

ENDANGERED AND THREATENED SPECIES

A considerable number of migratory birds inhabit the western portion of Wilkes Island. However, there are no endangered or threatened plant or animal species at Wake Island.

SUMMARY OF ENVIRONMENTAL SETTING

The environmental setting data reviewed for this investigation indicate that several significant items are relevant to the evaluation of past hazardous waste disposal and fuel handling practices at Wake Island Airfield. A generalized discussion is presented below.

- Annual precipitation averages about 37 inches. Evapotranspiration is estimated at 6 inches per year.
- The surface soils at Wake Island are believed to be highly permeable.
- Shallow aquifers probably communicating with local surface waters are present at or near land surface. All facility operations are located in the recharge zone of the respective shallow aquifer.
- No threatened or endangered species inhabit Wake Island Airfield.
- Ground water is readily available to supply wells due to the sandy and coral geology. However, the ground water is brackish due to the close proximity to the ocean and the limited land mass available to develop fresh water lenses.
- Drinking water is provided by treating water collected on a catchment area or by a distillation plant supplied from deep brackish wells.

From these major points it may be seen that pathways for the migration of hazardous waste-related contamination or POL loss exist at Wake Island Airfield. Contamination could be directed to local surface waters or shallow or deep aquifers and have adverse effect on health or the environment.

SECTION 4
FINDINGS

This section summarizes the hazardous wastes generated by installation activities, identifies hazardous waste accumulation and disposal sites located on Wake Island, and evaluates the potential environmental contamination from hazardous waste disposal sites. Past waste generation and disposal methods were reviewed to assess hazardous waste management practices at Wake Island Airfield.

INSTALLATION HAZARDOUS WASTE ACTIVITY REVIEW

A review was made of past and present installation activities that resulted in generation, accumulation and disposal of hazardous waste. Information was obtained from files and records, interviews with past and present installation employees and site inspections.

The sources of hazardous waste at Wake Island Airfield are grouped into the following categories:

- Industrial Operations (Shops)
- Waste Accumulation Areas
- Fuels Management
- Spills and Leaks
- Pesticide Utilization
- Fire Protection Training

The subsequent discussion addresses only those wastes generated at Wake Island Airfield which are either hazardous or potentially hazardous. Potentially hazardous wastes are grouped with and referenced as "hazardous wastes" throughout this report. A hazardous waste, for this report, is defined by, but not limited to, the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). For study purposes, waste petroleum products such as contaminated fuels, waste oils and waste solvents are also included in the "hazardous waste" category.

No distinction is made in this report between "hazardous subtance/materials" and "hazardous wastes". A potentially hazardous waste is one which is suspected of being hazardous although insufficient data are available to fully characterize the material.

Industrial Operations (Shops)

Summaries of industrial operations at the installation were developed from Wake Island Airfield and Hickam AFB files and interviews. Information obtained was used to determine which operations handle hazardous materials and which ones generate hazardous wastes. Summary information on all installation shops is provided as Appendix E, Master List of Shops.

For the shops identified as generating hazardous wastes, personnel were interviewed to determine the types and quantities of materials and present and past disposal methods. Information from files and interviews with installation employees is summarized in Table 4.1, which is located at the end of this discussion. The waste quantities presented in this table are based either on available file data or estimates of present quantities by installation personnel. Past quantities may have been significantly higher or lower, depending on the level of activity at the Airfield. Past disposal practices, presented as a timeline, are based on information obtained from former and current installation employees.

Industrial operations at Wake Island Airfield have included shops for maintenance of facilities and ground and marine equipment in support of transient Air Force missions. The industrial shops have been operated by Base Operating Support (BOS) contractor personnel since 1947. During the period between 1947 and 1972 industrial activities were limited to the maintenance of equipment, flightline servicing of aircraft and maintenance of housing for flight crews. The Federal Aviation Administration (FAA) was responsible for operation of the power plant, water distillation plant and the fire department. The FAA was also responsible for garbage collection and for pest management in areas other than the Air Force quarters. When the Air Force assumed responsibility for the island in 1972, their contractor took over these operations.

From 1972 to the present the shops have been organized into the following groups:

- o Base Operations
- o Transportation Division
- o Civil Engineering Division

Air Force facilities were located east of the 1700 Liquid Fuel Storage Area from 1947 to 1959. Facilities included a motor pool, distillation plant, mess hall, post exchange (PX) and barracks. Little information is available concerning waste generation from these shops during this period. The shops for flightline maintenance were located in the vicinity of the current AGE Shop (Building 1519). Hazardous waste generation from flightline operations has paralleled Air Force activity at the airfield. An average of 50 airplanes per month were serviced during this period; however, the number of aircraft serviced was significantly higher during the Korean War (1950-1953). Flightline activities included inspection; servicing with oil, hydraulic fluid and fuel; and maintenance, if required. Maintenance work performed included replacement of engines, propellers, tires, etc. Engines that were removed from aircraft were drained of fluids, cleaned and shipped off-base for repair. Tires and other parts that were repairable were also shipped off-base. Other scrap items were stored in a scrap metal pile near the 1700 Liquid Fuel Storage Area. Contaminated fuel was placed in a 500 gallon trailer and either disposed of in a fuel pit near the 1700 Liquid Fuel Storage Area or burned in fire protection training exercises. Waste oils, hydraulic fluids, etc. were used for dust control on base roads or for fire protection training.

In 1960 the Military Airlift Transport Services (MATS) facilities were constructed at the northwest tip of the north branch of Wake Island. Facilities included a temporary shop building (Building 1142), which was located near Building 1140, and a secondary wastewater treatment plant. The shop building housed the vehicle repair shop, entomology shop and building maintenance shops. The wastewater treatment plant was located near Wastewater Lift Station No. 9. Secondary treatment of wastewater was provided by trickling filters. Sludge was digested, Construction project contractors have operated temporary shops at Wake Island. During the period from 1979 to 1983 major construction projects included: construction of a seawall, runway repair, and tank repair. These projects were conducted under U.S. Navy contracts. Little information is available concerning hazardous waste generation and disposal by construction contractors, since the Navy served as Quality Assurance Evaluator for these projects. There are no records of the quantity of oils and solvents that were brought onto the island, since these materials were shipped to the base on barges. The contractors also took waste oil from the Air Force for use in their vehicles and equipment and for use on the runway pavement subgrade.

The contractor's motor pool was located east of Fire Protection Training Area No. 1. There is evidence of oil on the ground in this area. Contractors also disposed of many empty drums that had contained asphalt at the scrap metal pile.

Waste Accumulation Areas

There are four hazardous waste storage areas at Wake Island. Three of these are waste oil tanks. The other hazardous waste storage facility is an EPA-approved polychlorinated biphenyl (PCB) storage building (Building 1646). The locations of these four storage areas are shown in Figure 4.1.

One of the waste oil storage tanks is used to store waste lubricating oil from the diesel generators at the power plant. Another waste oil tank, located in the shop area, receives waste oil, solvents, and other fluids from the motor pool, heavy equipment repair shop and other shops. The wastes from these two tanks are used for dust control on unpaved roads. The third waste oil tank is located underground near the aircraft parking area. This tank was used for storage of waste oils and fluids from aircraft during the 1960's. Waste oil is no longer placed in the tank, however, at the time of the site visit for this study the tank was full of oil.

In 1982 a sample of dielectric oil was collected from all transformers on the base. All out of service transformers that were determined to be either PCB transformers or PCB-contaminated transformers, were placed on a monolithic concrete slab, surrounded by a curb, in Building 1646. A listing of the transformers in Building 1646 and PCB

TABLE 4.1

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	CURRENT WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1940, 1950, 1960, 1970, 1980)
BASE OPERATIONS DIVISION				
AEROSPACE GROUND EQUIPMENT (AGE) ENROUTE SERVICES/FLIGHTLINE	1519	MOTOR OIL	88 GALS./YR.	1947 FPTA/DUST CONTROL; DISPOSED ON GROUND
		ENGINE OIL	2 GALS./YR.	FPTA/DUST CONTROL; DISPOSED ON GROUND
		HYDRAULIC FLUID	2 GALS./YR.	FPTA/DUST CONTROL; DISPOSED ON GROUND
		PD-680	55 GALS./YR.	FPTA/DUST CONTROL; DISPOSED ON GROUND
		CONTAMINATED FUEL (AVGAS, JP-4, JP-5)	120 GALS./YR.	FPTA; 1962 FPTA/SEPTIC TANK; 1970 FPTA
POWER PRODUCTION	1190	PD-680	960 GALS./YR.	1959 DISCHARGED TO LAGOON
		WASTE OIL	3200 GALS./YR.	DUST CONTROL
LIQUID FUELS MANAGEMENT	1509	WASTE FUEL (AVGAS, JP-4, JP-5)	420 GALS./YR.	1947 FPTA 1966
TRANSPORTATION DIVISION				
MOTOR POOL	1403	PD-680	220 GALS./YR.	FPTA/DUST CONTROL; DUST CONTROL/LANDFILL
		MOTOR OIL	264 GALS./YR.	FPTA/DUST CONTROL; DUST CONTROL/LANDFILL
		BRAKE FLUID	12 GALS./YR.	FPTA/DUST CONTROL; DUST CONTROL/LANDFILL
		TRANSMISSION FLUID	36 GALS./YR.	FPTA/DUST CONTROL; 1974 DUST CONTROL/LANDFILL

KEY

——— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

NOTE: QUANTITIES SHOWN ARE CURRENT; PAST QUANTITIES MAY HAVE BEEN HIGHER OR LOWER.

TABLE 4.1 (cont'd)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	PRESENT LOCATION (BLDG. NO.)	WASTE MATERIAL	CURRENT WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1940 – 1950 – 1960 – 1970 – 1980)
TRANSPORTATION DIVISION (CONT'D)				
HEAVY EQUIPMENT	1406	ENGINE OIL	660 GALS./YR.	1966 FPTA/DUST CONTROL → DUST CONTROL/LANDFILL
		HYDRAULIC FLUID	120 GALS./YR.	FPTA/DUST CONTROL → DUST CONTROL/LANDFILL
		GEAR OIL	36 GALS./YR.	FPTA/DUST CONTROL → DUST CONTROL/LANDFILL
		PD-680	150 GALS./YR.	FPTA/DUST CONTROL → DUST CONTROL/LANDFILL
MARINE OPERATIONS	1710, 1711	PD 680	36 GALS./YR.	FPTA → SCRAP METAL PILE/LANDFILL
		MOTOR OIL	220 GALS./YR.	1972 FPTA → 1974 SCRAP METAL PILE/LANDFILL
BATTERY SHOP	1403	SULFURIC ACID	32 GALS./YR.	1947 SEPTIC TANK → 1960 SANITARY SEWER → 1972 SEPTIC TANK
		BATTERIES	2 BATTERIES/YR.	SCRAP METAL PILE
CIVIL ENGINEERING DIVISION				
PAINT SHOP	1410	PD 680	260 GALS./YR.	DISPOSED ON GROUND → 1972 BURN AREA (DUMP)
		PAINT	32 GALS./YR.	DISPOSED ON GROUND → BURN AREA (DUMP)
CORROSION CONTROL SHOP	1408	PD 680	990 GALS./YR.	1966 DISPOSED ON GROUND
WELDING SHOP	1511	PD 680	12 GALS./YR.	FPTA/DUST CONTROL → DUST CONTROL/LANDFILL
		TURBINE OIL	2 GALS./YR.	1966 FPTA/DUST CONTROL → 1974 DUST CONTROL/LANDFILL

KEY

———— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

NOTE: QUANTITIES SHOWN ARE CURRENT; PAST QUANTITIES MAY HAVE BEEN HIGHER OR LOWER.

TABLE 4.1 (cont'd)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	PRESENT LOCATION (BLDG. NO.)	WASTE MATERIAL	CURRENT WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL 1940 1950 1960 1970 1980
CIVIL ENGINEERING DIVISION (CONT'D)				
REFRIGERATION/AIR CONDITIONING	1514	PD 680	12 GALS./YR.	1947 FPTA/DUST CONTROL; 1974 DUST CONTROL/LANDFILL
		REFRIGERATION OIL	12 GALS./YR.	FPTA/DUST CONTROL; DUST CONTROL/LANDFILL
WASTEWATER TREATMENT PLANT	1600, 1306	LUBRICATING OIL	240 GALS./YR.	1972 SANITARY SEWER
WATER DISTILLATION PLANT	1306	PD 680	55 GALS./YR.	1959 TO LAGOON
		LUBRICATING OIL	240 GALS./YR.	DUST CONTROL/LANDFILL
ELECTRIC SHOP	1422	PD-680	110 GALS./YR.	1947 DISPOSED ON GROUND
LIQUID FUELS MAINTENANCE	1509	RESIDUAL TANK CLEANING SLUDGES	140 GALS./YR.	SLUDGE PITS; 1979 WEATHERED
HOBBY SHOPS				
AUTO HOBBY	WINDY PALACE	CONTAMINATED MOGAS	96 GALS./YR.	1956 FPTA/DUST CONTROL; 1974 DISPOSED ON GROUND
		MOTOR OIL	90 GALS./YR.	FPTA/DUST CONTROL; DISPOSED ON GROUND
		BRAKE FLUID	3 GALS./YR.	FPTA/DUST CONTROL; DISPOSED ON GROUND
PHOTO HOBBY	1185	PHOTOGRAPHIC FIXER SOLUTION	4 GALS./YR.	1960 SANITARY SEWER

KEY

——— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

NOTE: QUANTITIES SHOWN ARE CURRENT; PAST QUANTITIES MAY HAVE BEEN HIGHER OR LOWER.

TABLE 4.1 (cont'd)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	PRESENT LOCATION (BLDG. NO.)	WASTE MATERIAL	CURRENT WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1940 – 1950 – 1960 – 1970 – 1980)
NATIONAL WEATHER BUREAU				
WEATHER BALLOON SHELTER	102	COMPRESSOR OIL	1 GAL./YR.	1975 DISPOSED ON GROUND →
		ALUMINUM/CAUSTIC SLUDGE	200 GALS./YR.	1960 BURN AREA (DUMP) - - - - → 1975

KEY

——— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

NOTE: QUANTITIES SHOWN ARE CURRENT; PAST QUANTITIES MAY HAVE BEEN HIGHER OR LOWER.

contaminated transformers that are still in service is presented in Appendix D. Prior to 1982 out of service transformers were stored in a revetment on Elrod Drive or near the electric shop. Soil samples collected from in front of the revetment showed no evidence of PCB's.

Fuels Management

The Wake Island Airfield fuels management system consists of above-ground fuels storage tanks at three locations: the 1800 Liquid Fuel Storage Area, the 1700 Liquid Fuel Storage Area and the 1500 Liquid Fuel Storage Area. These storage areas are shown in Figure 4.2 and a summary of the major bulk fuel and oil storage facilities is provided in Appendix D.

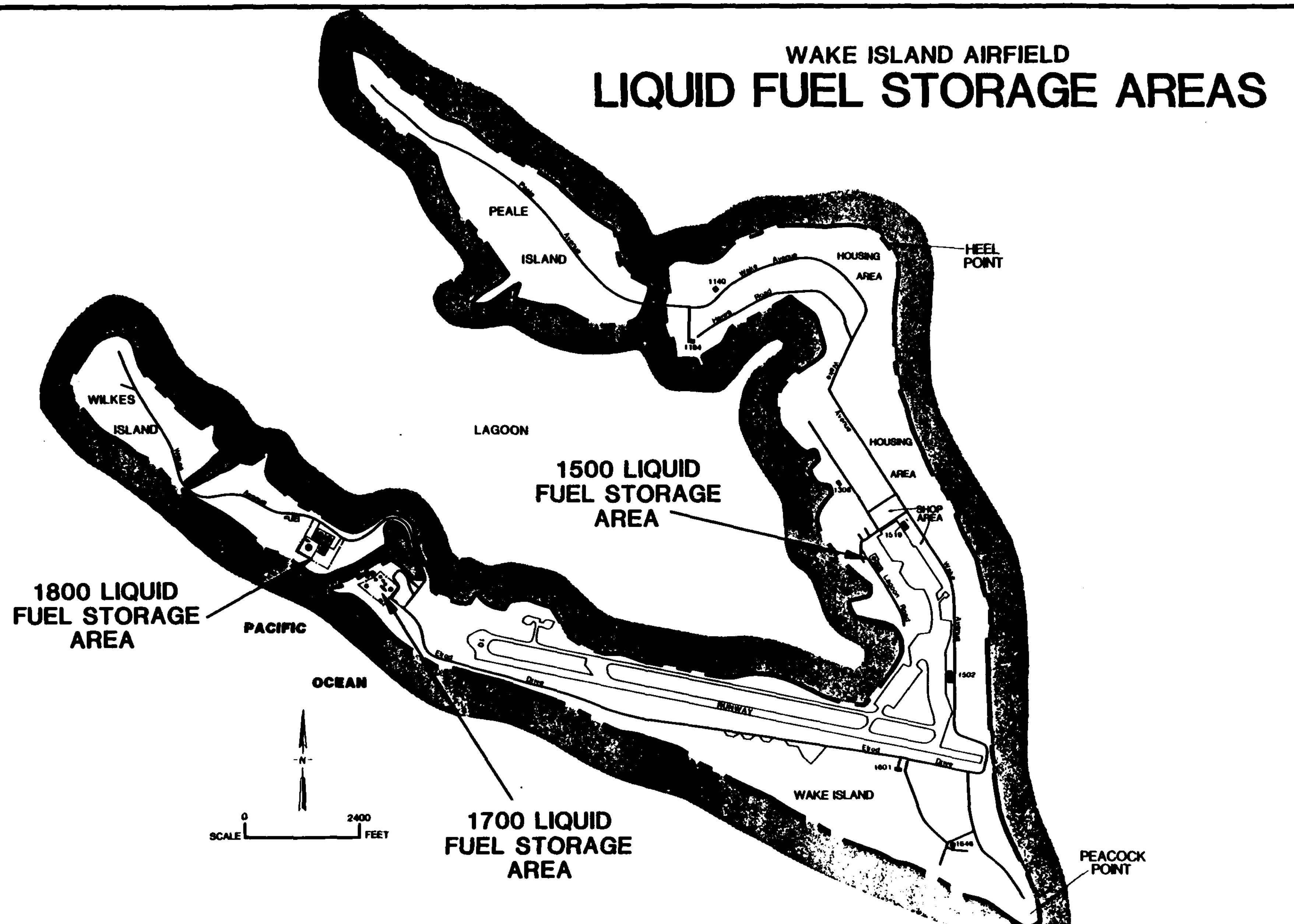
Fuels currently stored are JP-5, MOGAS and diesel. In the past, AVGAS, JP-4 and Jet A-1 were stored. The 1800 Liquid Fuel Storage Area, located on Wilkes Island was the Air Force storage area prior to 1972. The 1700 Liquid Fuel Storage Area (Mid-Pac storage area), was formerly owned and operated by the Standard Oil Company. All fuel arrives at Wake Island by tanker ship. The fuel is transferred from ships anchored off shore to storage tanks in the 1700 and 1800 areas through a floating pipeline. Fuel is then transferred to the 1500 area for issue.

Active storage tanks are cleaned and visually inspected every five years. Prior to 1979 the sludges were buried in sludge pits that were typically near the tanks and inside of dikes. The size of the pits was variable depending on the quantity of material in the tank. Table 4.1 presents average sludge quantity based on estimates by shop personnel; the quantity is variable depending on the number of tanks cleaned during the year. The only sludge pit that was identified as being outside of the dike was located on Wilkes Island on the western side of the 1800 Area. It was within the fenced area north of Tank No. 27. The pit was about 20 ft long by 10 ft wide and 4 ft deep. The pit was used in 1974. Most of the material that was placed in the pit was rust and scale. Since 1979 fuel sludges have been weathered in a 2 to 4 inch layer on the ground near the tanks.

The tanks at Wake Island Airfield are not equipped with fuel recovery systems, therefore when water is drained from the bottoms of the tanks some fuel is drained to the ground.

WAKE ISLAND AIRFIELD

LIQUID FUEL STORAGE AREAS



SOURCE: INSTALLATION DOCUMENTS

Spills and Leaks

Fuel, oil and hydraulic fluid spills have occurred at Wake Island Airfield along the flightline, in the shop area and in the liquid fuel storage areas. Flightline spills are washed to the coral and sand at the edges of pavements and are allowed to evaporate or percolate into the ground. Small quantities of solvent and oil are disposed of in the shop area by spilling the material on the ground. Oil is also used for dust control on base roads, primarily along Parakeet Street in the shop area, or Heiwa Road near the power plant and near the tennis courts in the 1100 Air Force housing area.

Fuel spills that have occurred at Wake Island Airfield include a spill of 260 gallons of jet fuel that was the result of an emergency landing by an F-4 fighter with a ruptured fuel valve (Figure 4.3). The plane was moved into the aircraft parking area and the fuel was allowed to seep into the ground. Another spill occurred in 1982 when Fuel Filter/Separator No. 6 was returned to service after repairs. The valve on the separator had been left open. Approximately 6,000 to 8,000 gallons of JP-4 spilled onto the ground near the separator. The diameter of the spill area was 10 feet. A third spill that occurred at the airfield happened in 1981 during Tropical Storm Frieda. The pipelines from the 1700 Liquid Fuel Storage Area to the fuel pier were washed out (Figure 4.4). Approximately 6,000 gallons of JP-4 that was in these lines were lost. Although fuel was lost from the lines, no fuel was lost from tanks.

Leaks have been found in fuel lines and fuel tanks. Leaks were discovered and repaired in a diesel fuel line near the hazardous cargo parking area and in a JP-5 defuel line under the aircraft parking area (Figure 4.5). No estimate of fuel loss is available, however, physical examination of the pipelines at the time of repair indicates that the leak in the diesel fuel line was small since the soil in the vicinity of the leak was not saturated with fuel and that the leak in the JP-5 line was relatively large since a layer of fuel approximately 1 foot deep was found floating on top of the ground water. However, test holes dug at three sites at the edges of the pavements showed no evidence of fuel. Also there was no fuel visible on the surface of a small pond approximately 100 ft southwest of the leak. In 1982 a small quantity of fuel

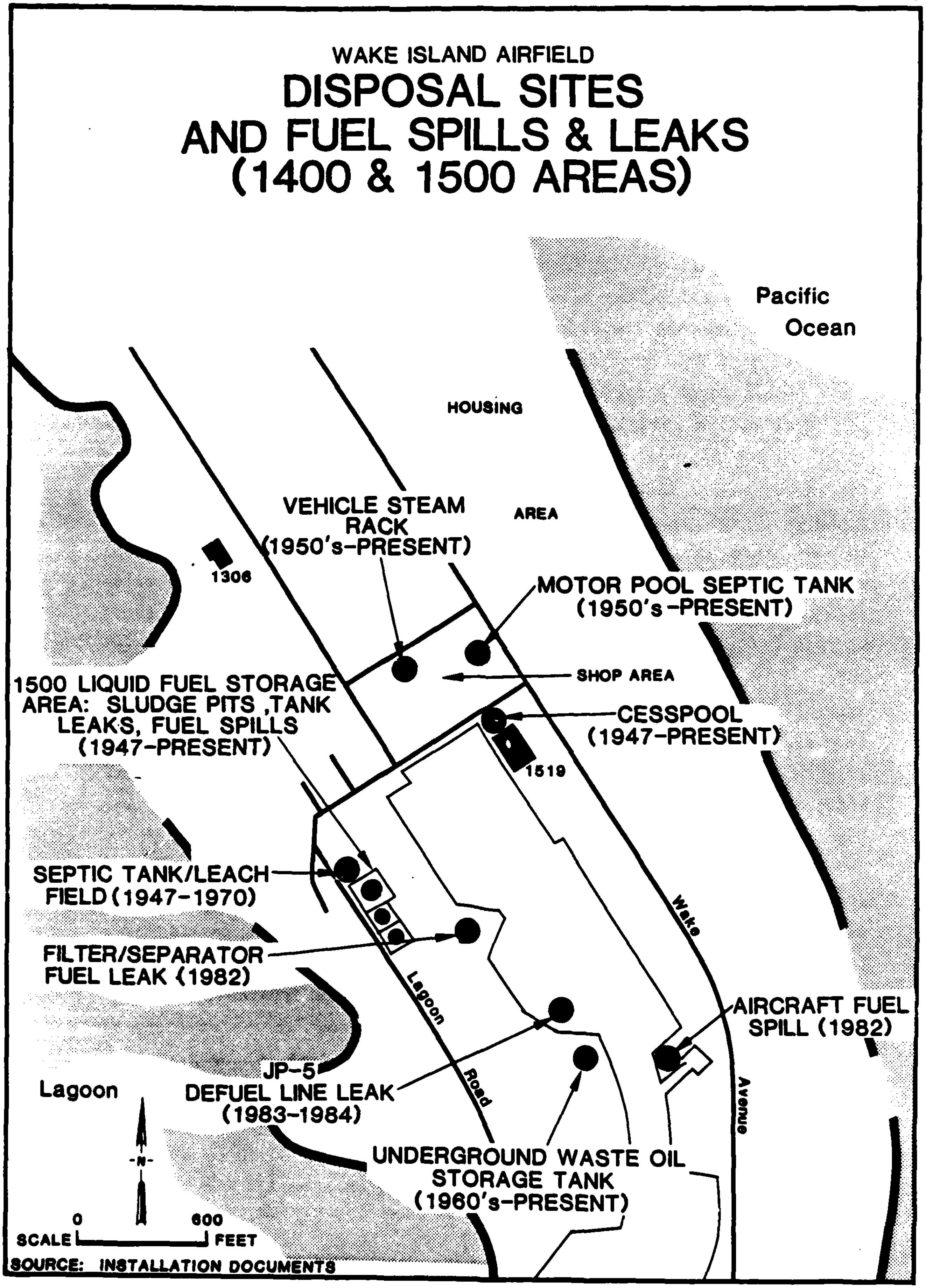
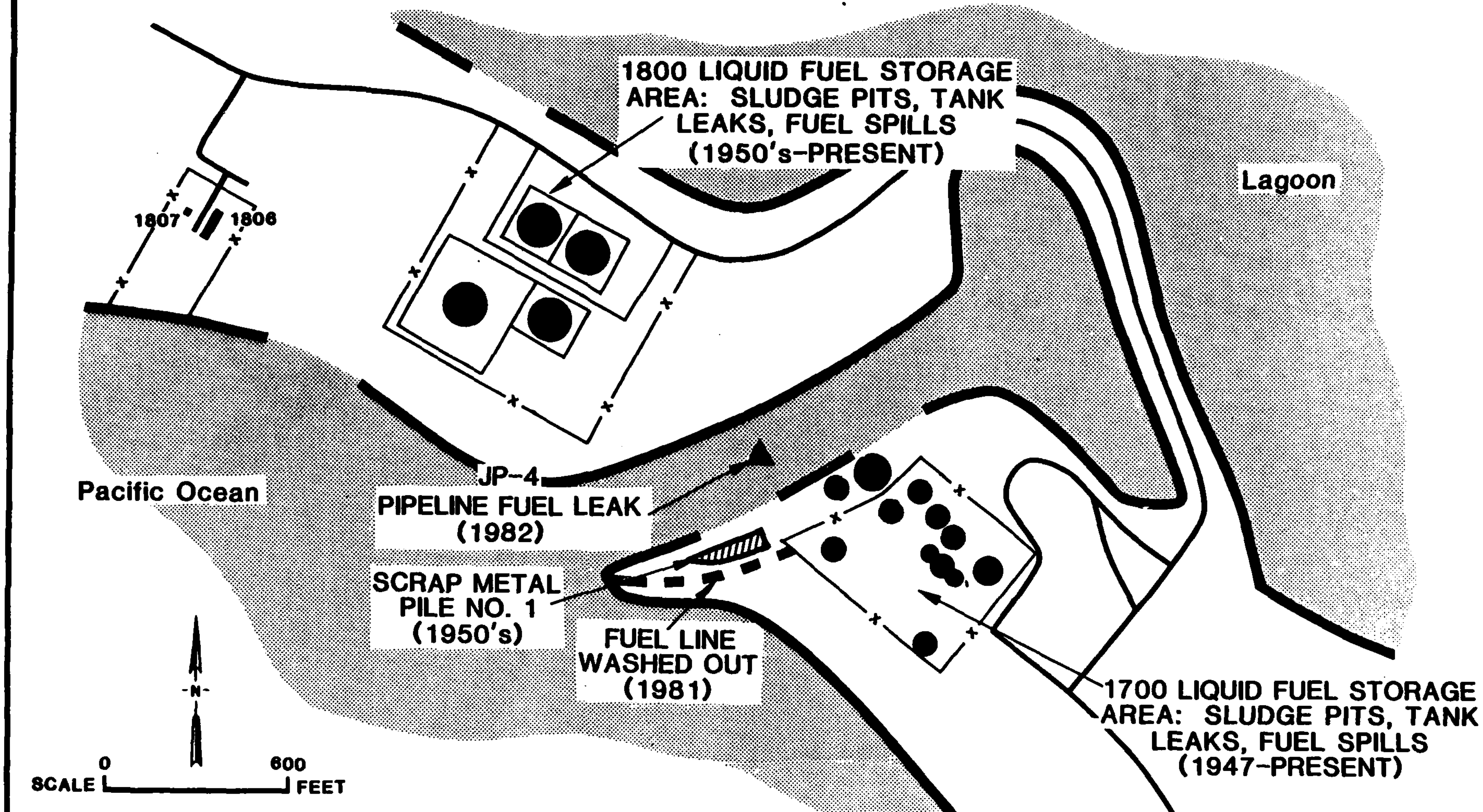

WAKE ISLAND AIRFIELD
DISPOSAL SITES
AND FUEL SPILLS & LEAKS
(1400 & 1500 AREAS)
Pacific
Ocean
HOUSING
AREA
VEHICLE STEAM
RACK
(1950's-PRESENT)
1306
MOTOR POOL SEPTIC TANK
(1950's-PRESENT)
SHOP AREA
1500 LIQUID FUEL STORAGE
AREA: SLUDGE PITS ,TANK
LEAKS, FUEL SPILLS
(1947-PRESENT)
CESSPOOL
(1947-PRESENT)
1519
SEPTIC TANK/LEACH
FIELD (1947-1970)
Wake
FILTER/SEPARATOR
FUEL LEAK (1982)
Lagoon
AIRCRAFT FUEL
SPILL (1982)
JP-5
DEFUEL LINE LEAK
(1983-1984)
Lagoon
Road
Avenue
-N-
UNDERGROUND WASTE OIL
STORAGE TANK
(1960's-PRESENT)
0
600
SCALE
FEET
SOURCE: INSTALLATION DOCUMENTS

FIGURE 4.4

WAKE ISLAND AIRFIELD

DISPOSAL SITES AND FUEL SPILLS & LEAKS (1700 & 1800 AREAS)



SOURCE: INSTALLATION DOCUMENTS

was observed floating on the surface of the water in the channel between the 1700 and 1800 Liquid Fuel Storage Area. A small leak was found in a pipeline that is located at the bottom of the channel. This fuel line was abandoned when the leak was discovered.

Leaks from the fuel tanks in the storage areas have not been well documented. However, inspection reports and a photographic record of the condition of the tanks indicate that leaks have occurred in all three storage areas. Several of the fuel storage tanks were condemned in 1974. The inspector noted severe corrosion of the seams and shells of some of the tanks and holes in the bases of some of the on-grade tanks. It is not known which of the fuel tanks were in service when they were condemned. There are reports of diesel fuel on the ground near the base of a storage tank in the 1700 area. Tanks on saddles were removed from the 1500 Area in 1979.

Small quantities waste oil and solvents are also spilled on the ground between the buildings in the shop area. It is also suspected that in the past electric shop personnel poured dielectric oil from transformers onto the ground near the shop. Ten soil samples were collected from locations around the water catchment areas and near the electric shop and analyzed for PCB's at the OEHL laboratory at Brooks AFB. PCB's were detected at 1.5 and 1.6 ppb in a sample from near the electric shop and in a sample from near the northwest corner of the catchment areas.

Pesticide Utilization

Pesticides have been utilized by Air Force personnel for insect and weed control at Wake Island Airfield since the early 1960's. Prior to 1972 the use of pesticides by the Air Force was limited to the 1100 Air Force facilities. The FAA was responsible for the pesticide program at the runway, fuel storage and other areas. Until 1970 pesticides were stored in Building 1142. From 1970 to 1972 they were stored in Building 1140. Insecticides are currently stored in Building 1422 and herbicides are stored in a shed in a fenced area adjacent to Building 1421. Herbicides are applied in the three liquid fuel storage areas, in antenna farms, around telephone and transformer boxes and around runway and taxiway lights. Insecticides are used primarily in the housing area.

Herbicides are mixed in the fenced area adjacent to Building 1421. The sprayers are cleaned with soap and water in the same area. Cleaning water from the sprayers and from rinsing of empty pesticide cans is dumped on the ground in this area. The rinsed cans are taken to the wet garbage landfill by entomology shop personnel.

Fire Protection Training

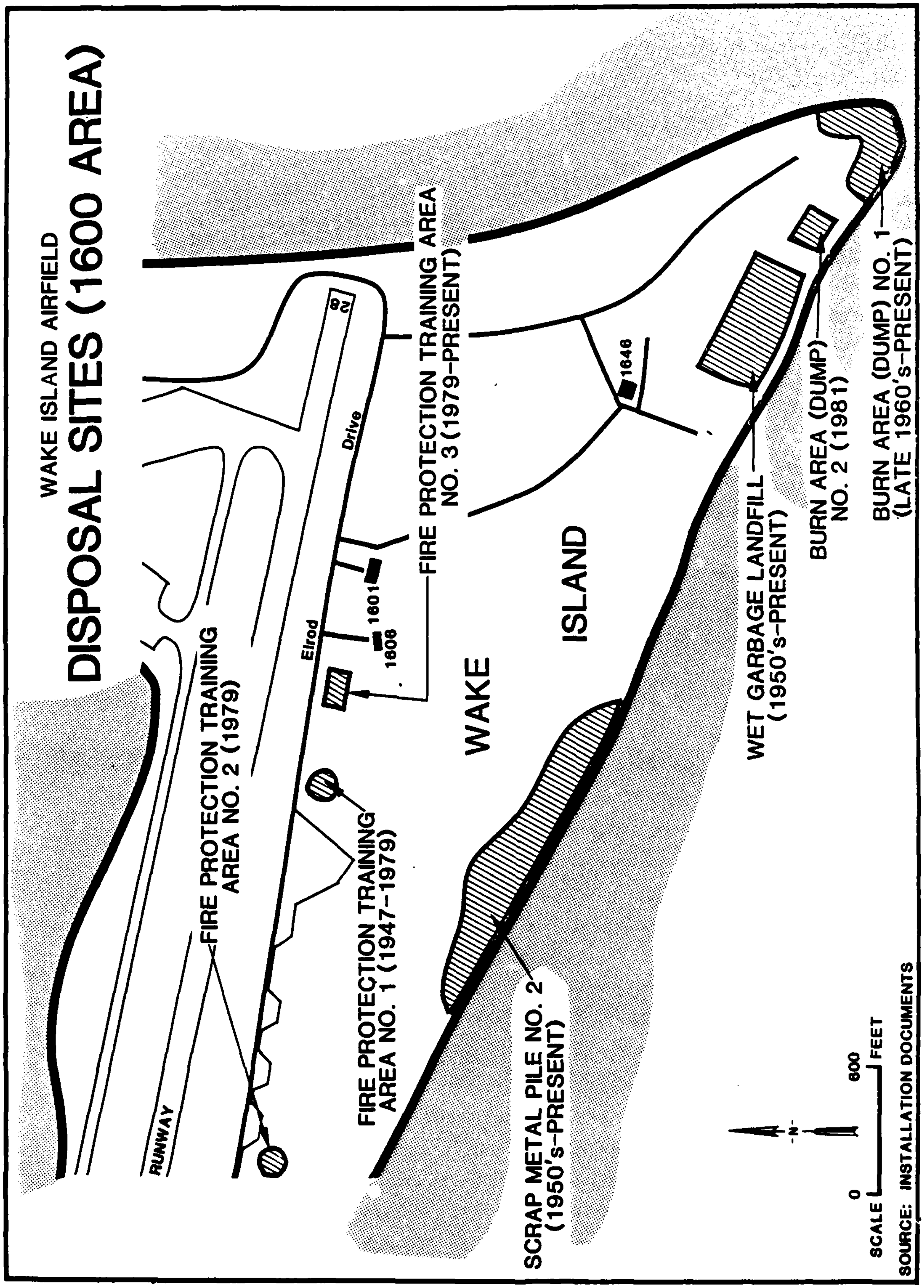
Wake Island Airfield has had a long history of fire training activities. The fire department at Wake Island was administered by the Federal Aviation Administration from 1947 to 1972. From 1973 to the present Air Force BOS contractors have been responsible for providing fire protection and conducting fire protection training exercises.

Three fire protection training areas have been used on Wake Island since 1947 (Figure 4.6). Fire Protection Training Area No. 1 was operated by the FAA with Air Force support until 1972. This area was also used by the Air Force from 1973 to 1979. The area was an unpaved circle approximately 100 ft in diameter. A mixed product, consisting of waste oil, solvents, hydraulic fluid and contaminated fuel, were burned at this location until 1974. The ground was wetted with water, then two drums of liquid wastes and 600 gallons of contaminated fuel were spread and the fire was ignited. From 1974 to 1979 only contaminated jet fuel was used. The number of fires at this site decreased from one per week during FAA operation, to one per month from 1973 to 1974, to one per quarter from 1974 to 1979. Extinguishing agents have included water, protein foam and aqueous film forming foam (AFFF).

Fire Protection Training Area No. 2 was used for only one attempted fire in 1979. The ground was wetted with water prior to the application of 200 gallons of JP-4. The fire could not be started, because the fuel percolated rapidly into the ground.

Fire Protection Training Area No. 3 has been used from 1979 to the present. The area is a concrete slab approximately 100 ft x 100 ft surrounded by a 1-ft high coral and sand dike. An out of service POL storage tank serves as an aircraft simulator. From 1979 to 1983 exercises were conducted quarterly. For the past year exercises have been conducted every six months. The concrete slab is wetted before fuel is spread. Two hundred gallons of contaminated or non-contaminated fuel

FIGURE 4.6



WAKE ISLAND AIRFIELD
DISPOSAL SITES (1600 AREA)
FIRE PROTECTION TRAINING AREA NO. 2 (1979)
FIRE PROTECTION TRAINING AREA NO. 1 (1947-1979)
FIRE PROTECTION TRAINING AREA NO. 3 (1979-PRESENT)
RUNWAY
Elrod
Drive
28
1601
1606
1646
WAKE
ISLAND
SCRAP METAL PILE NO. 2 (1950's-PRESENT)
WET GARBAGE LANDFILL (1950's-PRESENT)
BURN AREA (DUMP) NO. 2 (1981)
BURN AREA (DUMP) NO. 1 (LATE 1960's-PRESENT)
N
SCALE 0 600 FEET
SOURCE: INSTALLATION DOCUMENTS

are burned per fire. Fires are extinguished with 600 gallons of water and 20 to 30 gallons of AFFF.

INSTALLATION WASTE DISPOSAL METHODS

A review was made of the methods used to dispose of hazardous wastes at Wake Island Airfield. Wastes disposed off the installation were excluded from the study. Information was obtained from installation files and employee interviews.

The facilities and methods used for disposal of hazardous wastes at the installation includes the following categories:

- Landfills
- Refuse Burn Areas (Dumps)
- Scrap Metal Piles
- Septic Tanks and Cesspools
- Ground Application
- Miscellaneous

Appendix F presents photographs of several disposal areas discussed.

Landfill

A landfill, located on the southwest side of Peacock Point on Wake Island, has been operated since the 1950's (Figure 4.6). The landfill has been operated by the utilities shop since 1972. Prior to 1972, garbage and refuse disposal were the responsibility of the FAA. The area of the landfill is estimated to be approximately 10 acres. The landfill is used for disposal of wet garbage, consisting mainly of food scraps from the mess hall. Approximately 40 cubic feet of garbage is disposed of daily. A trench and fill method of operation with daily cover is used. Trenches are 150 to 250 yards long, 25 ft wide and 8 to 10 ft deep. The trenches have a northeast-southwest orientation. Landfilling was first started on the eastern side of the site.

Although current operating procedures prohibit the dispoal of combustible materials such as waste oils and solvents, information from installation employees indicates these materials have been disposed of in the landfill. The landfill has also received paints and thinners, rinsed and unrinsed pesticide containers, rags and other miscellaneous shop wastes. Closed portions of the landfill have been graded. Some vegetation has been established on the closed portions of the fill area.

Refuse Burn Areas (Dumps)

Refuse burn areas have been used by the Air Force for disposal of wastes at Wake Island Airfield. Two burn areas (Figure 4.6) have been used. Burn Area No. 1 is located at the tip of Peacock Point. Paper, wood, tires, etc. have been burned in this area since the late 1960's.

An earthen berm has been constructed at the tip of the point by bulldozing sand and coral toward the ocean. Wastes that are to be burned are piled on the ground on the island side of the berm. A small amount of MOGAS or solvent is poured on the wastes and the fire is started. The ashes and metal items that remain after burning are bulldozed into the berm. Metal items such as diesel engines, aircraft and ground vehicle mechanical parts, empty 55-gallon drums, cans, etc. are present in this area. According to installation personnel a large percentage of these metal items were taken to the point by the FAA when they were leaving the island.

Another burn area, located between Burn Area No. 1 on Peacock Point and the wet garbage landfill, is shown in Figure 4.6. This area was used temporarily in 1981 when the other burn area was unusable because of high waves during Tropical Storm Freida.

Both burn areas on Wake Island have received waste solvents, oils, and paints from industrial shops. It is also suspected that waste oil has also been buried in a shallow pit at Burn Area No. 2.

Scrap Metal Piles

Two scrap metal piles have been used for storage and disposal of scrap metal at Wake Island Airfield. Scrap Metal Pile No. 1 (Figure 4.4) was located on the point southeast of the 1700 Liquid Fuel Storage Area during the 1950's. The scrap metal stored in this area may have been disposed along with garbage and rubbish in the Pacific Ocean southeast of Wilkes Island.

Scrap Metal Pile No. 2 (Figure 4.6) is located along the beach south of Elrod Drive on Wake Island. The area has been used as a disposal area since the late 1950's. Abandoned vehicles, equipment, storage tanks, aircraft parts, wheels, batteries, fire extinguishers, debris from demolished buildings and facilities have been disposed of in this area. An estimated 25,000 drums are at the site. Approximately 18,000 of these empty drums contained asphalt used for a runway repair project. Although relatively few of the remaining 7,000 drums were full of wastes, installation personnel have indicated that some drums contained waste oils and solvents. The contents of some drums were also poured on the ground in this area. Empty drums were then either left at the disposal site or taken back to the shop.

Septic Tanks and Cesspools

Septic tanks and cesspools have been used for disposal of wastes from the Wake Island flightline and shop area. The septic tanks that have been identified as receiving hazardous waste are the septic tank at the location of Wastewater Lift Station No. 7 and the septic tank that currently serves the motor pool (Figure 4.3). The solids from these septic tanks have been pumped from the tanks and discharged to the ocean, however some wastes may have been released to the ground through the leaching facilities. These wastes include fuel that was disposed of in the septic tank at Lift Station No. 7 in the 1960's.

A cesspool near the Building No. 1519 may have received hazardous waste from the cleaning of aircraft engines. The engines were drained of fluids and degreased before shipment off base for repairs. Heavy equipment and trucks have been cleaned at the vehicle steam rack near the heavy equipment shop. Stoddard solvent has been used for degreasing in this area. Drains from the steam rack probably lead to a cesspool since this facility is not connected to the wastewater collection system.

Ground Application

Oiling of unpaved roads has been a method of dust control at Wake Island Airfield. Photographs from the early 1950's show that road oiling was practiced extensively during that era. The practice of using waste oils for this purpose continues to the present. Oil from the shop area and power production plant has recently been spread mainly on Parakeet Street, Heiwa Avenue, and along unpaved roads near the 1100 Air Force housing facilities.

Miscellaneous

Wake Island has several miscellaneous waste disposal areas. The area between the taxiway and the lagoon was used for disposal of coral blocks and other debris that was washed onto the runway during Tropical Storm Frieda. The area between the aircraft parking area and the lagoon was used for disposal of debris from buildings that were destroyed in this area during the same storm. The fuel pipes that were damaged in the storm are stored at the western end of the runway.

EVALUATION OF PAST DISPOSAL ACTIVITIES AND FACILITIES

Review of past waste generation and management practices at Wake Island Airfield has resulted in identification of 22 sites and/or activities which were initially considered as areas of concern for potential hazards to health, welfare or the environment.

Sites Eliminated from Further Evaluation

The sites of initial concern were evaluated considering specific waste disposal and site conditions and using the Flow Chart presented in Figure 1.2. Sites not considered to have a potential for contamination were deleted from further evaluation. The sites which have potential for contamination and migration of contaminants were evaluated using the Hazard Assessment Rating Methodology (HARM). Table 4.2 summarizes the results of the Flow Chart logic for each of the areas of initial concern.

Seven of the 22 sites at Wake Island Airfield were considered not to have a potential for contamination and thus deleted from further evaluation. The rationale for elimination of these sites is presented below. The waste oil tank near the aircraft parking area was full of oil at the time of the site visit. Information from installation personnel indicates that this tank has not been used for at least 10 years prior to the site visit. The tank is apparently not leaking and therefore there is no apparent potential for contamination. Thus the tank was eliminated from further consideration.

Soil samples collected from in front of the revetment where transformers were stored were analyzed for PCB's. Based on the results of these analyses which indicated the absence of PCB's and the lack of

TABLE 4.2
SUMMARY OF FLOW CHART LOGIC FOR AREAS OF INITIAL HEALTH, WELFARE AND ENVIRONMENTAL CONCERN AT WAKE ISLAND AIRFIELD

Site Description	Potential Hazard to Health, Welfare or Environment	Need for Further IRP Evaluation/ Action	HARM Rating
Shop Area	Yes	Yes	Yes
1500 Liquid Fuel Storage Area	Yes	Yes	Yes
1700 Liquid Fuel Storage Area	Yes	Yes	Yes
1800 Liquid Fuel Storage Area	Yes	Yes	Yes
Underground Waste Oil Storage Tank	No	No	No
Transformer Storage Revetment	No	No	No
Aircraft Fuel Spill	Yes	Yes	Yes
JP-5 Defuel Line Leak	Yes	Yes	Yes
Filter/Separator No. 6 Fuel Leak	Yes	Yes	Yes
Diesel Fuel Line Leak	No	No	No
Pesticide Handling (Bldgs. 1140 & 1142)	No	No	No
1100 AF Housing Area (Sludge Disposal)	No	No	No
Fire Protection Training Area No. 1	Yes	Yes	Yes
Fire Protection Training Area No. 2	Yes	Yes	Yes
Fire Protection Training Area No. 3	Yes	Yes	Yes
Landfill	Yes	Yes	Yes

TABLE 4.2 (Continued)
SUMMARY OF FLOW CHART LOGIC FOR AREAS OF INITIAL HEALTH, WELFARE AND ENVIRONMENTAL CONCERN AT WAKE ISLAND AIRFIELD

Site Description	Potential Hazard to Health, Welfare or Environment	Need for Further IRP Evaluation/ Action	HARM Rating
Burn Area No. 1	Yes	Yes	Yes
Burn Area No. 2	Yes	Yes	Yes
Scrap Metal Pile No. 1	No	No	No
Scrap Metal Pile No. 2	Yes	Yes	Yes
Installation Road System	Yes	Yes	Yes
Storm Debris Storage Area	No	No	No

Source: Engineering-Science

management practices. Results of the HARM analysis for the sites at Wake Island Airfield are summarized in Table 4.3.

The procedures used in the HARM system are outlined in Appendix G and the specific rating forms for the sites that were evaluated are presented in Appendix H. The HARM system is designed to indicate the relative need for follow-on action.

TABLE 4.3
SUMMARY OF HARM SCORES FOR POTENTIAL CONTAMINATION SITES
AT WAKE ISLAND AIRFIELD

Site	Receptor Subscore	Waste Characteristic Subscore	Pathways Subscore	Waste Management	Final Score
Shop Area	59	80	79	1.0	73
Installation Road System	63	80	76	1.0	73
1800 Liquid Fuel Storage Area	55	80	76	1.0	70
1700 Liquid Fuel Storage Area	55	80	76	1.0	70
1500 Liquid Fuel Storage Area	57	80	69	1.0	69
Scrap Metal Pile No. 2	47	80	76	1.0	68
Filter/Separator No. 6 Leak	57	80	61	1.0	66
JP-5 Defuel Line Leak	55	80	58	1.0	64
Fire Protection Training Area No. 1	41	80	69	1.0	63
Burn Area Dump No. 1	44	48	76	1.0	56
Burn Area Dump No. 2	44	48	76	1.0	56
Landfill	44	48	76	1.0	56
Aircraft Fuel Spill	57	48	61	1.0	55
Fire Protection Training Area No. 2	41	48	69	1.0	53
Fire Protection Training Area No. 3	41	48	69	0.95	50

Source: Engineering-Science

SECTION 5

CONCLUSIONS

The goal of the IRP Phase I Study is to identify sites where there is potential for environmental contamination resulting from past waste disposal practices and to assess the probability of contaminant migration from these sites. The conclusions given below are based on field inspections; review of records and files; review of the environmental setting; interviews with present and former installation employees; and assessments using the HARM system. Table 5.1 contains a list of the potential contamination sources identified for Wake Island Airfield and a summary of the HARM scores for all sites evaluated.

SHOP AREA

The shop area has sufficient potential for environmental contamination and follow-on investigation is warranted. A number of specific sites within the shop area have been grouped and evaluated as a single site using the HARM system. Wastes disposed of in this area consist mainly of contaminated fuel and waste oil, solvents and hydraulic fluid. These wastes have been disposed of in septic tanks and cesspools, located within the shop area. Also since 1972 wastes including solvents, oil and paint thinner have been disposed of on the ground between buildings. Due to the long period of operation in this area and periods of high aircraft activity at the airfield, the quantity of wastes disposed of in this area is considered to be large. The large quantity of wastes; combined with a relatively high receptor subscore, due to proximity to the distillation plant wells; and high pathways subscore results in an overall HARM score of 73.

INSTALLATION ROAD SYSTEM

The installation road system has sufficient potential for environmental contamination and follow-on investigation is warranted. Waste

TABLE 5.1
SITES EVALUATED USING THE HAZARD ASSESSMENT RATING METHODOLOGY
AT WAKE ISLAND AIRFIELD

Rank	Site	Operation Period	HARM Score(1)
1	Shop Area	1947-Present	73
2	Installation Road System	1947-Present	73
3	1800 Liquid Fuel Storage Area	1950's-Present	70
4	1700 Liquid Fuel Storage Area	1947-Present	70
5	1500 Liquid Fuel Storage Area	1947-Present	69
6	Scrap Metal Pile No. 2	1950's-Present	68
7	Filter/Separator No. 6 Leak	1982	66
8	JP-5 Defuel Line Leak	1983-1984	64
9	Fire Protection Training Area No. 1	1947-1979	63
10	Burn Area (Dump) No. 1	1960's-Present	56
11	Burn Area (Dump) No. 2	1981	56
12	Landfill	1950's-Present	56
13	Aircraft Fuel Spill	1982	55
14	Fire Protection Training Area No. 2	1979	53
15	Fire Protection Training Area No. 3	1979-Present	50

(1) This ranking was obtained using the Hazard Assessment Rating Methodology (HARM) described in Appendix G. Individual rating forms are in Appendix H.

oil and solvents have been sprayed on based roads for dust control from 1947 to the present. The quantity of oil used for this purpose is large, based on information from historical photographs and base employees. In recent years road oiling has been limited mainly to Parakeet Street, Heiwa Road and to unpaved roads in the housing areas. The high receptors subscore, because of spraying oil near the distillation plant wells, contributes to the overall HARM score of 73.

1800 LIQUID FUEL STORAGE AREA

The 1800 Liquid Fuel Storage Area is considered to have sufficient potential for environmental contamination and follow-on investigation is warranted. AVGAS, JP-4 and JP-5 have been stored in fuel tanks in this area. There have been fuel spills, leaks from tanks, burial of sludges and weathering of sludges in this area. The overall HARM score for this area of 70 is due primarily to the relatively high waste characteristic and pathways subscores.

1700 LIQUID FUEL STORAGE AREA

The 1700 Liquid Fuel Storage Area is considered to have sufficient potential for environmental contamination and follow-on investigation is warranted. This area has been used for storage of MOGAS, diesel, AVGAS and jet fuels. For purposes of evaluation the 1700 Liquid Fuel Storage Area is considered to include the tank area and the point of land between the storage tanks and the fuel pier. Fuel spills in this area include the fuel that was spilled when the pipeline was washed out by Tropical Storm Freida and possibly fuel that was disposed of in a pit on the point south of the storage tanks. These spills combined with leaks from tanks and the disposal of tank sludges by burial and weathering within the fenced area constitute a large quantity of wastes. The large quantity of waste combined with the high pathways subscore results in an overall HARM score of 70.

1500 LIQUID FUEL STORAGE AREA

The 1500 Liquid Fuel Storage Area is considered to have sufficient potential for contamination and follow-on investigation is warranted. MOGAS, diesel, AVGAS and jet fuels have been stored in this area. Fuel leaks and disposal of sludges have occured in this area. The final HARM score for the area is 69.

SCRAP METAL PILE NO. 2

Scrap Metal Pile No. 2 is considered to have sufficient potential for environmental concern and follow-on investigation is warranted. This area is primarily used for disposal of metal equipment and storage containers including 55-gallon drums that are not serviceable or needed. However the area has also been used for disposal of shop wastes including paints, thinners, solvents and oil. The high pathways sub-score due to proximity of the site to the ocean contributes to the overall HARM score of 68.

LIQUID FUEL FILTER/SEPARATOR NO. 6 LEAK

The area of the leak from the liquid fuel filter/separator is considered to have sufficient potential for environmental concern and follow-on investigation is warranted. The leak occurred in 1982 when the system was returned to service after repair. The large quantity of fuel spilled is the primary reason for the overall HARM score of 66.

JP-5 DEFUEL LINE LEAK

The area of the leak from the JP-5 defuel line is considered to have sufficient potential for environmental concern. The leak was located during testing of the underground fuel lines. No estimate of the fuel loss from this leak is available, however, the presence of fuel floating on top of the ground water at the time of repair of the line indicates that the leak was large. The overall HARM score for the area is 64.

FIRE PROTECTION TRAINING AREA NO. 1

Fire Protection Training Area No. 1 is considered to have sufficient potential for contamination and follow-on investigation is warranted. This fire protection training area was used during the period from 1947 to 1979. A mixture of fuel, waste oil and solvents was burned in this area during exercises until 1974. The area was unpaved and a large number of exercises were conducted, therefore the quantity of residual material is considered to be large. The high waste characteristics and pathways subscores are mainly responsible for the overall HARM score of 63.

BURN AREA (DUMP) NO. 1

Burn Area (Dump) No. 1 is considered to have sufficient potential for contamination and follow-on investigation is warranted. The burn area has been used since the late 1960's for burning trash and rubbish. Small quantities of hazardous wastes from shops have been disposed of in this area. The overall HARM score for the site is 56 due primarily to the high pathways subscore.

BURN AREA (DUMP) NO. 2

Burn Area (Dump) No. 2 is considered to have sufficient potential for contamination and follow-on investigaton is warranted. This burn area was used for only a few months during the period when the other area was not usable because it was flooded. The quantity of wastes disposed of is small due to the short period of use, however the overall HARM score is 56, which is identical to the score for Burn Area No. 1.

LANDFILL

The landfill is considered to have sufficient potential for contamination and follow-on investigation is warranted. The landfill has been used primarily for disposal of garbage from the mess hall that is not combustible. However, small quantities of shop wastes have also been disposed of in the landfill. The overall HARM score for this area is 56.

AIRCRAFT FUEL SPILL

The Aircraft Fuel Spill is judged to have minimal potential for environmental contamination due to the small quantity of fuel and no further follow-on action is warranted. Approximately 260 gallons of jet fuel leaked from an aircraft after the plane made an emergency landing. The final HARM score is 55.

FIRE PROTECTION TRAINING AREA NO. 2

Fire Protection Training Area No. 2 is considered to have minimal potential for contamination and due to the small quantity of fuel no further follow-on investigation is warranted. The area was used for only one attempted fire in 1979. The total quantity of fuel that was used is 200 gallons. The overall HARM score for the area is 53.

FIRE PROTECTION TRAINING AREA NO. 3

Fire Protection Training Area No. 3 is considered to have minimal potential for contamination and additional follow-on investigation is not warranted. This fire protection training area has been used since 1979. The area consists of a concrete slab surrounded by a coral and sand dike. The overall HARM score for the site is relatively low, 50, due to the small quantity of fuel that has been used and the partial containment.

SECTION 6
RECOMMENDATIONS

Fifteen sites were identified at Wake Island Airfield as having the potential for environmental contamination. These sites have been evaluated and rated using the HARM system which assesses their relative potential for contamination and provides the basis for determining the need for additional Phase II, IRP investigation. Twelve of the fifteen sites have sufficient potential to create environmental contamination and warrant Phase II investigations. The sites evaluated have been reviewed concerning land use restrictions which may be applicable.

RECOMMENDED PHASE II MONITORING

The subsequent recommendations are made to further assess the potential for environmental contamination from waste disposal areas and leak/spill sites at Wake Island Airfield. The recommended actions are sampling programs to determine if contamination does exist at the site. If contamination is identified in this first-step investigation, the Phase II sampling program will probably need to be expanded to define the extent and type of contamination. This may include additional soil borings and monitoring wells, as well as additional analytical parameters. The recommended monitoring program is summarized in Table 6.1 and discussed below. Monitoring for several of the sites has been combined in Table 6.1 due to their close proximity.

The recommended monitoring program for the sites at Wake Island Airfield includes soil sampling, installation and sampling of shallow wells, and sampling of existing brackish wells. Electrical resistivity for detection and delineation of contaminant plumes is not recommended because of the background interference that would be caused by the brackish water.

TABLE 6.1
RECOMMENDED MONITORING PROGRAM FOR PHASE II
IRP AT WAKE ISLAND AIRFIELD

Site (Rating Score)	Recommended Monitoring Program	Comments
Shop Area (73)	Obtain samples from four soil borings within shop area. Samples should be collected from surface and a 3-foot depth. Analyze the samples for the parameters in Table 6.2, List B-1. Install and sample four monitoring wells including one well on northwestern side of Wake Avenue. The latter well can be eliminated if the brackish well at Facility 603 can be sampled. Collect samples from distillation plant wells upstream and downstream from distillation units. The samples collected from the wells should be analyzed for the parameters in Table 6.2, List B-2.	Continue monitoring if sampling indicates contamination. Additional monitoring wells may be necessary to assess extent of the contamination. Soil sampling at additional locations and at greater depths may be required if contamination is found.
Installation Road System (73)	Obtain samples from six soil borings and three control borings in areas where roads have been oiled relatively recently. Samples should be collected at the surface and at 3 feet below the ground surface. Analyze the samples for parameters in Table 6.2, List C-1. If contamination is determined to be significant, then expand the sampling program.	Collect samples from additional locations and at greater depths if contamination is found.
1800 Liquid Fuel Storage Area (70)	Sample existing well (Facility 1807) or install and sample a monitoring well west of storage area and two additional wells north and south of the storage area. Analyze samples for parameters in Table 6.2, List A-2. Collect soil samples from surface and at a depth of 3 feet from five soil borings in area. Analyze samples for parameters in Table 6.2, List A-1.	Continue monitoring if sampling indicates contamination. Additional monitoring wells may be necessary to assess extent of the contamination.
1700 Liquid Fuel Storage Area (70)	Install three monitoring wells and five soil borings. Collect samples from the wells and soil borings (at the surface and 3 feet below ground surface) and analyze samples for parameters listed in Table 6.2, Lists A-1 and A-2 for soil samples and water samples, respectively.	Continue monitoring if sampling indicates contamination. Additional monitoring wells may be necessary to assess extent of the contamination.

TABLE 6.1 (Continued)
RECOMMENDED MONITORING PROGRAM FOR PHASE II
IRP AT WAKE ISLAND AIRFIELD

Site (Rating Score)	Recommended Monitoring Program	Comments
1500 Liquid Fuel Storage Area (69) Filter/Separator No. 6 Fuel Leak (66) and Defuel Line Leak (64)	Collect soil samples at the ground surface and at a depth of 3 feet from four soil borings in the fuel storage area and two borings at the location of the filter/separator fuel leak. Analyze the soil samples for the parameters in Table 6.2, List A-1. Install three monitoring wells, including one near the JP-5 fuel leak, one east of the storage area and one between the storage area and the lagoon. Analyze water samples for parameters in Table 6.2, List A-2.	These sites have been combined due to close proximity and similar type of potential contaminants. Additional monitoring wells may be required if contamination is found.
Scrap Metal Pile No. 2 (68)	Install and sample two monitoring wells. Analyze the water samples for the parameters listed in Table 6.2, List D-2. Obtain samples from four soil borings and analyze the samples for the parameters listed in Table 6.2, List D-1. Soil samples should be obtained from the ground surface and from a depth of 3 feet.	Continue monitoring if sampling indicates contamination. Additional monitoring wells may be necessary to assess extent of the contamination. Soil sampling at additional locations and at greater depths may be required if contamination is found.
Fire Protection Training Area No. 1 (56)	Sample existing wells at Facilities 1601 and 1606, and install monitoring well at the site. Analyze water samples for parameters listed in Table 6.2, List D-2. Collect soil samples at the surface, and at 3 feet below the ground surface, and analyze for the parameters listed in Table 6.2, List D-1.	Continue monitoring if sampling indicates contamination. Additional monitoring wells may be necessary to assess extent of the contamination. Soil sampling at additional locations and at greater depths may be required if contamination is found.
Landfill (56)	Install a well northeast and a well southwest of the landfill. Collect water samples from the wells and analyze for parameters listed in Table 6.2, List E-2. No sampling of soils in this area is recommended.	Continue monitoring if sampling indicates contamination. Additional monitoring wells may be necessary to assess extent of the contamination. Soil sampling at additional locations and at greater depths may be required if contamination is found.
Burn Area (Dump) No. 1 and and Burn Area (Dump) No. 2 (56)	Collect samples from five soil borings. One of the soil borings should be located near the wastewater treatment plant. Two borings should be located in each of the burn areas. Soil samples should be collected from the surface and at 3-feet (depth) and analyzed for the parameters in Table 6.2, List E-1.	These two sites have been combined due to close proximity and similarity of wastes disposed of at the sites. Monitoring wells may be required if contamination is found in soil samples to more fully characterize the nature and extent of the contamination.

Source: Engineering-Science.

Both soil and water samples should be obtained to characterize the contamination because of limitations on achievable detection limits and interferences that are caused by the chloride concentration in the brackish water. The analysis of brackish water samples for lead cannot be performed by graphite furnace methods, therefore, low levels of lead cannot be detected. Analysis for total organic halogens is not meaningful for brackish water samples. Thus this analysis is not recommended for water samples. A screening of volatile hydrocarbons should be performed using gas chromatography with a flame ionization detector. If contamination is found, further analysis using a photo-ionization detector can be used for quantification of specific organics.

Monitoring wells should be constructed of 2-inch diameter PVC, using a ten to fifteen foot machine-slotted screened section mechanically fitted to a solid wall casing. The wells should be installed to penetrate 8 to 10 feet into the water table. The screened section should be installed with approximately 2 feet of the screen above the elevation of the upper surface of the ground water table. This will allow collection of floating contaminants. A sand pack should be provided to protect the well screen. Wells should be sealed by use of cement-bentonite grout.

The depth at which soil samples can be collected is limited because of the difficulty in retaining a sample of granular material in samplers. The samples can probably be collected at depths up to 3 feet using a hand sampler, however, if contamination is found in the first three feet, sampling at greater depths may be required.

Shop Area

The shop area has a potential for environmental contamination. The recommended monitoring program for this area includes soil borings and the installation of monitoring wells. Up to four monitoring wells should be installed to detect contamination and possibly to monitor migration of contaminants from the shop area. A monitoring well should be installed on the northwestern side of Wake Avenue. Sampling of the 24 ft deep well at Facility 603 may eliminate the need for installation of this monitoring well. Up to two monitoring wells should be placed within the shop area to detect contamination from septic tanks and cesspools. A monitoring well should be placed near Lift Station No. 7

to detect contamination from the septic tank/leach facility that was located at this site. This well may also be useful to detect contamination from the 1500 Liquid Fuel Storage Area. Samples collected from these wells should be analyzed for the parameters listed in Table 6.2, List B-2. Water samples should also be collected from the distillation plant deep wells upstream and downstream from the distillation units. These samples should be analyzed for the parameters listed in Table 6.2, List B-2. Up to four soil borings should be obtained in the shop areas. Samples should be collected at the surface and at a depth of three feet. The samples should be analyzed for the parameters listed in Table 6.2, B-1. If contamination is found, the Phase II monitoring program should be expanded.

Installation Road System

The practice of spraying oil on roads for dust control has a potential for environmental contamination. The initial monitoring program should be limited to areas of the island that have been oiled relatively recently. Tentative soil sampling activities should include collection of samples from two locations along Parakeet Street, two locations along Heiwa Road (near the power plant), and two locations near the tennis courts in the MATS housing area. The sampling program should be increased to include other areas that show signs of recent oiling. Samples should be collected from the surface and at a depth of three feet. Samples should also be collected from control borings off the roads. The samples should be analyzed for the parameters listed in Table 6.2, List C-1. If significant contamination is found; the number of sampling locations, the depth at which samples are collected and possibly the analytical parameters should be increased.

1800 Liquid Fuel Storage Area

The 1800 Liquid Fuel Storage Area has a potential for contamination. Up to three monitoring wells should be installed to detect contamination from this storage area. One well should be installed northwest and somewhat removed from the storage area to serve as a control well. A well is located at Facility 1807, however, the well is at a depth of 40 feet, which may be too deep for monitoring purposes. An additional two wells, one north and one south of the storage tanks, should be installed. A minimum of five soil borings should be taken in

TABLE 6.2
RECOMMENDED LIST OF ANALYTICAL PARAMETERS
FOR PHASE II IRP AT WAKE ISLAND AIRFIELD

List A (POL Areas)

1. Soil Samples	2. Water Samples
Oil and Grease	Oil and Grease
Volatile Hydrocarbons	Volatile Hydrocarbons
Lead	Lead

List B (Shop Area)

1. Soil Samples	2. Water Samples
Oil and Grease	Oil and Grease
Volatile Hydrocarbons	Volatile Hydrocarbons
Lead	Lead
PCB's	PCB's
	Phenols
	Sulfate

List C (Installation Road System)

1. Soil Samples

Oil and Grease
PCB's

List D (Scrap Metal Pile, Fire Protection Training Area)

1. Soil Samples	2. Water Samples
Oil and Grease	Oil and Grease
Volatile Hydrocarbons	Volatile Hydrocarbons
Lead	Lead
	Phenols
	Sulfate

List E (Landfill, Burn Areas)

1. Soil Samples	2. Water Samples
Oil and Grease	Oil and Grease
Volatile Hydrocarbons	Volatile Hydrocarbons
Lead	Lead
Iron	Iron

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the storage area. Four of the soil borings should be within the dikes around the tanks, and the fifth should be northwest of Tank No. 27 near the fence. This latter location is the site of a sludge disposal pit. Soil samples should be taken at the surface and three feet deep. The water samples from monitoring wells and soil samples from the soil borings should be analyzed for the parameters listed in Table 6.2, Lists A-2 and A-1, respectively. If contamination is detected, the monitoring program at this site should be modified accordingly.

1700 Liquid Fuel Storage Area

The 1700 Liquid Fuel Storage Area has a potential for contamination. Recommendations for Phase II Monitoring in this area include at least three wells and up to five soil borings. One well should be installed east of the storage area. Two additional wells should be installed in the fuel storage area to determine if the water is contaminated. These water samples should be analyzed or the parameters in Table 6.2, A-2. Samples should be collected from the surface and three feet deep from a control soil boring located outside the fuel storage area and from four borings located within the fuel storage area and analyzed for the parameters in Table 6.2, A-1. If contaminants are found, then the monitoring program may require expansion to characterize the extent of the contamination and to evaluate migration of contaminants.

1500 Liquid Fuel Storage Area, Filter Separator No. 6 Fuel Leak and Defuel Line Leak

These three sites have a potential for environmental contamination. The recommended monitoring program includes collection of a surface sample and a three foot deep borings; four located in the fuel storage area and two at the location of the fuel leak from the filter separator. The pipeline fuel leak occurred under asphalt pavement at a depth greater than 3 feet; therefore, collection of shallow soil samples is not recommended. Three monitoring wells are recommended: one located near the site of the JP-5 fuel leak; one located east of the fuel storage area and one between the storage area and the lagoon. Soil and water samples should be analyzed for the parameters listed in Table 6.2, A-2 and A-1, respectively. If contamination is detected, then additional monitoring may be required.

Scrap Metal Pile No. 2

The scrap metal pile has a potential for environmental contamination. The recommended monitoring program for this site includes installation of a minimum of two monitoring wells and up to four soil borings. One monitoring well should be located between the scrap metal pile and Fire Protection Training Area No. 1. The other well should be located adjacent to the metal pile. Samples from these wells should be analyzed for the parameters in Table 6.2, List D-2. One soil boring should be located near the monitoring well between the scrap metal pile and the fire protection training area, and the remaining three should be located along the length of the pile. Samples collected from these three borings at the ground surface and at a depth of three feet should be analyzed for the parameters in Table 6.2, List D-1.

Fire Protection Training Area No. 1

This area has a potential for contamination. The recommended monitoring program includes sampling existing brackish wells, collection of soil samples and installation of a monitoring well at the training area. The existing wells are located at Facilities 1601 and 1606 and are believed to be 40 and 20 feet deep, respectively. Samples from these two wells and from the monitoring well should be analyzed for the parameters listed in Table 6.2, List D-2. Soil samples should be collected at the surface and at three feet below ground. These samples should be analyzed for the parameters in Table 6.2, List D-1. The results of the analysis of these water and soil samples should be used to evaluate the need for further monitoring.

Landfill

The landfill has a potential for environmental contamination. The recommended program for this site consists of installing two monitoring wells, one northeast and one southwest of the landfill. Water samples collected from these two wells should be analyzed for the parameters in Table 6.2, List E-2. The results of these analyses should be evaluated to determine the need for additional monitoring. No sampling of soils in this area is recommended.

Burn Area (Dump) No. 1 and Burn Area (Dump) No. 2

The burn areas have a potential for environmental contamination. The sampling program for these two areas consists of collection of soil samples from a control boring near the wastewater treatment plant and collection of samples from two borings in each of the areas. Samples should be collected from the surface and three feet deep. Samples should be analyzed for the parameters listed in Table 6.2, List E-1. If contamination is found at these areas, then further monitoring may be necessary.

RECOMMENDED GUIDELINES FOR LAND USE RESTRICTIONS

It is desirable to have land use restrictions for the identified sites to (1) provide continued protection of human health, welfare, and environment; (2) insure that migration of potential contaminants is not promoted through improper land uses; (3) facilitate compatible development of future USAF facilities and (4) allow identification of property which may be proposed for excess or outlease.

The recommended guidelines for land use restrictions at each identified disposal site at Wake Island Airfield are presented in Table 6.3. A description of the land use restriction guidelines is included in Table 6.4. Land use restrictions at sites recommended for on-site monitoring should be re-evaluated upon completion of the Phase II program and appropriate changes made.

TABLE 6.3
RECOMMENDED GUIDELINES AT POTENTIAL CONTAMINATION SITES FOR LAND USE RESTRICTIONS
WAKE ISLAND AIRFIELD

	Recommended Guidelines for Future Land Use Restrictions[1]											
	Construction on the site	Excavation	Well construction on or near the site	Agricultural use	Silvicultural use	Water infiltration (run-on, ponding, irrigation)	Recreational use	Burning or ignition source	Disposal operations	Vehicular traffic	Material storage	Housing on or near the site
Shop Area	NR	NR	R	R	R	R	NR	NR	NR	NR	NR	NR
Installation Road System	NR	NR	R	NR	R	R	NR	NR	NR	NR	NR	NR
1800 Liquid Fuel Storage Area	NR	NR	R	R	R	R	NR	R	NR	NR	NR	R
1700 Liquid Fuel Storage Area	NR	NR	R	R	R	R	NR	R	NR	NR	NR	R
1500 Liquid Fuel Storage Area	NR	NR	R	R	R	R	NR	R	NR	NR	NR	R
Scrap Metal Pile No. 2	NR	NR	R	NR	R	R	NR	NR	NR	NR	NR	NR
Filter/Separator No. 6 Leak	NR	NR	R	NR	R	R	NR	R	NR	NR	NR	NR
JP-5 Defuel Line Leak	NR	NR	R	NR	R	R	NR	NR	NR	NR	NR	NR
Fire Protection Training Area No. 1	NR	NR	R	R	R	R	NR	NR	NR	NR	NR	R
Burn Area (Dump) No. 1	NR	NR	R	NR	R	R	NR	NR	NR	NR	NR	NR
Burn Area (Dump) No. 2	NR	NR	R	NR	R	R	NR	NR	NR	NR	NR	NR
Landfill	R	R	R	R	R	R	NR	NR	NR	NR	NR	R

(1) See Table 6.4 for description of guidelines.
Note the following symbols in this table:

R = Restrict the use of the site for this purpose
NR = No restriction of the site for this purpose
NA = Not applicable.

(2) Restrict for all wastes except for construction/demolition debris.

Source: Engineering-Science

TABLE 6.4
DESCRIPTIONS OF GUIDELINES FOR LAND USE RESTRICTIONS

Guideline	Description
Construction on the site	Restrict the construction of structures which make permanent (or semi-permanent) and exclusive use of a portion of the site's surface.
Excavation	Restrict the disturbance of the cover or subsurface materials.
Well construction on or near the site	Restrict the placement of any wells (except for monitoring purposes) on or within a reasonably safe distance of the site. This distance will vary from site to site, based on prevailing soil conditions and ground-water flow.
Agricultural use	Restrict the use of the site for agricultural purposes to prevent food chain contamination.
Silvicultural use	Restrict the use of the site for silvicultural uses (root structures could disturb cover or subsurface materials).
Water infiltration	Restrict water run-on, ponding and/or irrigation of the site. Water infiltration could produce contaminated leachate.
Recreational use	Restrict the use of the site for recreational purposes.
Burning or ignition sources	Restrict any and all unnecessary sources of ignition, due to the possible presence of flammable compounds.
Disposal operations	Restrict the use of the site for waste disposal operations, whether above or below ground.
Vehicular traffic	Restrict the passage of unnecessary vehicular traffic on the site due to the presence of explosive material(s) and/or of an unstable surface.
Material storage	Restrict the storage of any and all liquid or solid materials on the site.
Housing on or near the site	Restrict the use of housing structures on or within a reasonably safe distance of the site.

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APPENDIX A

BIOGRAPHICAL DATA

Biographical Data

ROBERT L. THOEM
Civil/Environmental Engineer

PII Redacted

[redacted]

Education

B.S. Civil Engineering, 1962, Iowa State University, Ames, IA
M.S. Sanitary Engineering, 1967, Rutgers University, New Brunswick, NJ

Professional Affiliations

Registered Professional Engineer in six states
American Academy of Environmental Engineering (Diplomate)
American Society of Civil Engineers (Fellow)
National Society of Professional Engineers (Member)
Water Pollution Control Federation (Member)

Honorary Affiliations

Who's Who in Engineering
Who's Who in the Midwest
USPHS Traineeship

Experience Record

1962-1965 U.S. Public Health Service, New York, NY. Staff Engineer, Construction Grants Section (1962-1964). Technical and administrative management of grants for municipal wastewater facilities.

Water Resources Section Chief (1964-1965). Supervised preparation of regional water supply and pollution control reports.

1966-1983 Stanley Consultants, Muscatine, IA and Atlanta, GA. Project Manager and Project Engineer (1966-1973). Responsible for managing studies and preparing reports for a variety of industrial and governmental environmental projects.

Environmental Engineering Department Head (1973-1976). Supervised staff involved in auditing environmental practices, conducting studies and preparing reports concerning water and wastewater systems, solid waste and resource recovery and water resources projects (industrial and governmental).

Robert L. Thoem (Continued)

Resource Management Department Head (1976-1982). Responsible for multidiscipline staff engaged in planning and design of water and wastewater systems, solid waste and resource recovery, water resources, bridge, site development and recreational projects (industrial, domestic and foreign governments).

Associate Chief Environmental Engineer (1980-1983). Corporate-wide quality assurance responsibilities on environmental engineering planning projects.

Operations Group Head and Branch Office Manager (1982-1983). Directed multidiscipline staff responsible for planning and design of steam generation, utilities, bridge, water and wastewater systems, solid waste and resource recovery, water resources, site development and recreational projects (industrial, domestic and foreign governments). Administered branch office support activities.

Project Manager/Engineer for over 25 industrial projects, 25 city and county projects ranging in present study area population from 1,400 to 1,700,000, 10 regional (multi-county) planning or operating agency projects, five state agency projects, 10 projects for federal agencies, and several projects for Middle East governments.

1983-Date Engineering-Science. Senior Project Manager. Responsible for managing a variety of environmental projects. Conducted hazardous waste investigations at seven U.S. Air Force installations to identify the potential migration of contaminants resulting from past disposal practices under the Phase I Installation Restoration Program. Evaluated solid waste collection, disposal and potential for resource recovery at a U. S. Army post. Process selection and preliminary design studies and reports for expanding a municipal advanced wastewater treatment plant from 36 mgd to 54 mgd.

Publications and Presentations

Over thirteen presentations and/or papers in technical publications dealing with solid waste, sludge, water, wastewater and project cost evaluations.

Biographical Data

JOHN R. ABSALON
Hydrogeologist

PII Redacted

[redacted]

Education

B.S. in Geology, 1973, Upsala College, East Orange, New Jersey

Professional Affiliations

Certified Professional Geologist (Indiana No. 46, Virginia No. 241)
Association of Engineering Geologists
Geological Society of America
National Water Well Association

Experience Record

1973-1974 Soil Testing Incorporated-Drilling Contractors, Seymour, Connecticut. Geologist. Responsible for the planning and supervision of subsurface investigations supporting geotechnical, ground-water contamination, and mineral exploitation studies in the New England area. Also managed the office staff, drillers, and the maintenance shop.

1974-1975 William F. Loftus and Associates, Englewood Cliffs, New Jersey. Engineering Geologist. Responsible for planning and management of geotechnical investigations in the northeastern U.S. and Illinois. Other duties included formal report preparation.

1975-1978 U.S. Army Environmental Hygiene Agency, Fort McPherson, Georgia. Geologist. Responsible for performance of solid waste disposal facility siting studies, non-complying waste disposal site assessments, and ground-water monitoring programs at military installations in the southeastern U.S., Texas, and Oklahoma. Also responsible for operation and management of the soil mechanics laboratory.

1978-1980 Law Engineering Testing Company, Atlanta, Georgia. Engineering Geologist/Hydrogeologist. Responsible for the project supervision of waste management, water quality assessment, geotechnical, and hydrogeologic studies at commercial, industrial, and government facilities. General experience included planning and management of several ground-water monitoring programs, John R. Absalon (Continued)

development of remedial action programs, and formulation of waste disposal facility liner system design recommendations. Performed detailed ground-water quality investigations at an Air Force installation in Georgia, a paper mill in southwestern Georgia, and industrial facilities in Tennessee.

1980-Date Engineering-Science. Hydrogeologist. Responsible for supervising efforts in waste management, solid waste disposal, ground-water contamination assessment, leachate generation, and geotechnical and hydrogeologic investigations for clients in the industrial and governmental sectors. Performed geologic investigations at twelve Air Force bases and other industrial sites to evaluate the potential for migration of hazardous materials from past waste disposal practices. Conducted RCRA ground-water monitoring studies for industrial clients and evaluated remedial action alternatives for a county landfill in Florida. Conducted quality management, hydrogeologic and ground-water quality programs for the pulp and paper industry at several mills located in the Southeast United States.

Publications and Presentations

"Practical Aspects of Ground-Water Monitoring at Existing Disposal Sites," 1980, coauthor: R.C. Starr, Proceedings of the EPA National Conference on Management of Uncontrolled Hazardous Sites, HMCRI, Silver Spring, MD.

"Improving the Reliability of Ground-Water Monitoring Systems," 1981, Proceedings of the Madison Conference of Applied Research and Practice on Municipal and Industrial Waste, University of Wisconsin-Extension, Madison, WI.

"Identification and Treatment Alternatives Evaluation for Contaminated Ground Water," 1982, coauthor: M. R. Hockenbury. Presented to Association of Engineering Geologists Symposium on Hazardous Waste Disposal, Atlanta, 17 September.

"Preliminary Assessment of Past Waste Storage and Disposal Sites," 1982, coauthor: W. G. Christopher. Presented to Association of Engineering Geologists Symposium on Hazardous Waste Disposal, Atlanta, 17 September.

"Treatment Alternatives Evaluation for Aquifer Restoration," 1983, coauthor: M. R. Hockenbury, Proceedings of the Third National Symposium on Aquifer Restoration and Ground Water Monitoring, NWWA, Worthington, OH.

BIOGRAPHICAL DATA

Rocco M. Palazzolo
PII Redacted
Environmental Engineer

[redacted]

Education

B.S. in Civil Engineering, Wayne State University, 1981
M.S. in Environmental Engineering, Georgia Institute of Technology, 1983.

Professional Affiliations

Water Pollution Control Federation

Honorary Affiliation

Tau Beta Pi

Experience Record

1974-1976 R. D. Palazzolo Associates, Consulting Engineers, P.C., Detroit, Michigan. Engineering Assistant responsible for vendor follow-up during expansion of an transmission manufacturing plant. Acted as liaison between automobile manufacturer and vendors of machine tools, fixtures, gages, etc. Duties included preparation of weekly progress reports, maintenance of records, informing vendors of design changes, etc.

1978-1981 R. D. Palazzolo Associates, Consulting Engineers, P.C., Detroit, Michigan. Checked designs of machine tools, fixtures, gages, and materials handling equipment. Also served as Manufacturers' Representative for tool and die shops.

1981-1983 Georgia Institute of Technology, Atlanta, GA. Graduate Research Assistant in projects including development of a means to improve hydraulic behavior of fluidized bed reactors, review and experimental testing of hydraulic models of fluidization and sedimentation, and a study of absorption enhanced anaerobic treatment of coal gassification wastewater. Responsible for design and construction of experimental apparatus, system operation and maintenance, experimental measurements and analyses, review of

Rocco M. Palazzolo

data and preparation of reports. Also taught undergraduate classes in water distribution and sewer system collection design.

1983-Date Engineering-Science, Inc., Atlanta, GA. Project Engineer responsible for preparation of a RCRA Part B Permit Application. Work included review of hazardous waste management practices and facilities at the plant for compliance with federal and state regulations. Hazardous waste management processes included container and tank storage, disposal in an on-site secure landfill, and treatment by incineration.

Project Engineer responsible for investigation of environmental impact of a closed garbage and rubbish landfill on a proposed apartment development, including investigation of pollution of ground water and surface water in a nearby stream. Work included development of the history of the landfill, field sampling and measurements, review of data, and presentation of recommendations.

Publications

Khudenko, B.M. and Palazzolo, R.M. "Hydrodynamics of Fluidized Bed Reactors for Wastewater Treatment". Proceedings: First International Conference on Fixed Film Biological Processes, April 20-23, 1982, Kings Island, Ohio, Vol. 3, pp. 1288-1334.

Palazzolo, R.M. and Khudenko, B.M. "Development of A New Type of Fluidized Bed Reactor". International Conference on Scale-up of Water and Wastewater Treatment Processes, March 17 and 18, 1983, Edmonton, Alberta, Canada.

APPENDIX B

LIST OF INTERVIEWEES AND OUTSIDE AGENCY CONTACTS

TABLE B.1

LIST OF INTERVIEWEES

Most Recent Position	Years of Service
Wake Island Airfield	
1. Carpentry Shop/Utilities Work Leader	34
2. Billeting Section Supervisor	33
3. Refrigeration/Air Conditioning Repairman	9
4. Personnel Support Services Clerk	17
5. Boat Operator	15
6. Heavy Equipment Repair Work Leader	18
7. Heavy Equipment Operator	22
8. Civil Engineering Manager	3
9. Flightline Supervisor	14
10. Welding Shop Work Leader	26
11. Liquid Fuels Maintenance Work Leader	18
12. Motor Pool Work Leader	17
13. Traffic Agent	16
14. AGE/Enroute Services Work Leader	33
15. Paint Shop Work Leader	16
16. AGE/Enroute Services Mechanic	26
17. AGE/Enroute Services Mechanic	24
18. Electric Shop Work Leader	12
19. Fireman	12
20. Water/Sewerage Work Leader	15
21. Utility Man	7
22. Corrosion Control Shop Work Leader	17
23. Plumbing Shop Work Leader	28
24. Real Property Supervisor	2
25. Entomologist	19
26. Power Plant Supervisor	8
27. Power Plant Mechanic	12
28. Power Plant Mechanic	6
29. Fire Department Chief	2
30. Fire Department Captain	11
31. Liquid Fuels Maintenance Corrosion Control Specialist	28
32. Safety Quality Control Officer	15
33. Medical Technician	9
34. POL Maintenance Driver/Operator	28
35. Equipment Repair Technician, NOAA	2
36. Marine Department Equipment Operator	22
37. Civil Engineering QAE	1
38. Liquid Fuels Management Work Leader	10
39. Civil Engineering Clerk	3

TABLE B.1 (Continued)

LIST OF INTERVIEWEES

Most Recent Position	Years of Service
Hickam AFB	
1. Chief, Real Estate Branch	34
2. NCOIC, Bioenvironmental Engineering Services	3
3. NCO, Bioenvironmental Engineering Services	1
4. Liquid Fuels Management Work Leader	22
5. Chief of Bioenvironmental Engineering Services	4
6. Mechanical Superintendent	9
7. Civil Engineer	3

TABLE B.2

OUTSIDE AGENCY CONTACTS

U.S. Geological Survey Water Resources Division 300 Ala Moana Boulevard, Room 6110 Honolulu, Hawaii 96850 Dan A. Davis, District Chief	(808/546-8333)

APPENDIX C

TENANT ORGANIZATIONS AND MISSIONS

APPENDIX C

TENANT ORGANIZATIONS AND MISSIONS

The 15th ABW is the host unit at Wake Island Airfield. Following are the major assigned/supported units and tenants at the installation.

NATIONAL WEATHER SERVICE, N.O.A.A.

The National Weather Service collects meterological data for use by aircraft and ships transiting the Pacific Ocean and for long-range weather forecasting.

TRANSPACIFIC CABLE COMPANY, AT&T

The Transpacific Cable Company provides telephone service for islands in the Pacific Ocean. There are currently no Transpacific Cable Company personnel stationed on the island. Their facilities are maintained by the Air Force.

APPENDIX D

SUPPLEMENTAL BASE FINDINGS INFORMATION

TABLE D.1

PESTICIDES USED
WAKE ISLAND AIRFIELD

Type	Use	Current Approximate Annual Quantity(1)
Roundup	Herbicide	300 gal.
Diuron(2)	Herbicide	3600 lb.
Diazinon	Insecticide	288 gal.
D-Phenothrin	Insecticide	72 cans (aerosol)
Baygon	Insecticide	432 gal.

(1) Based on 1983 usage.
(2) Use to be discontinued.

TABLE D.2

LIQUID FUEL AND WASTE OIL TANKS
WAKE ISLAND AIRFIELD

Facility	Material Stored	No. of Tanks	Total Storage Capacity (gal)	Above or Below Ground	Diked or Undiked
1700 Area	Diesel	1	887,000	Above	Diked
	Diesel	1	648,000	Above	Undiked
	Abandoned (Diesel)(1)	1	2,579,000	Above	Undiked
	Abandoned (Jet A-1)(1)	3	1,254,000	Above	Undiked
	Abandoned (JP-4)(1)	3	3,518,000	Above	Undiked
	Mogas	1	217,000	Above	Diked
1800 Area	JP-5	1	4,261,404	Above	Diked
	Abandoned (JP-4)(1)(2)	3	3,645,408	Above	Diked
1500 Area	Mogas	1	70,350	Above	Undiked
	Diesel	1	101,346	Above	Undiked
	JP-5	3	1,711,492	Above	Diked
	Diesel	1	3,100	Above	Undiked
	Diesel	1	100	Above	Undiked
Power Plant	Diesel	2	48,433	Above	Diked
	Waste Oil	1	10,000	Above	Diked
Motor Pool	Diesel	1	2,500	Below	NA
	Waste Oil(3)	1	150	Above	Undiked
AGE	Mogas	1	2,000	Below	NA
Tower	Diesel	1	3,000	Above	Diked
Terminal	Diesel	1	3,000	Below	NA
Vortac	Diesel	3	1,400	Above	Undiked
Mess Hall	Diesel	1	100	Above	Undiked
Transpacific Cable Bldg.	Diesel	1	Unknown	Below	NA
Lagoon Rd.	Abandoned (Waste Oil)	1	Unknown	Below	NA

(1) Abandoned in place, not cleaned, filled with seawater.
(2) To be removed as part of contract to build new tanks.
(3) Receives other waste fluids in addition to oil.
NA = Not applicable.

TABLE D.3

PCB TRANSFORMERS* IN STORAGE
WAKE ISLAND AIRFIELD

Description	Serial Number
225 KVA	C864745
75 KVA	67AF6738
50 KVA	59SE832
25 KVA	7223493
5 KVA	P10510
(1)	6120-012 (2)
(1)	6120-004

* PCB transformers: PCB>500 ppm

(1) Manufacturer's plate missing, KVA unknown.

(2) Transformer located at Wake Island School (not in service).

Note: Transformers stored in Building 1646

Source: Air Force Installation Documents

TABLE D.4

PCB CONTAMINATED* TRANSFORMERS IN SERVICE
WAKE ISLAND AIRFIELD

Transformer Location	Description	Serial Number
1800 Liquid Fuel Storage Area	5 KVA	D494567-60P
1800 Liquid Fuel Storage Area	5 KVA	D445624-60P
1800 Liquid Fuel Storage Area	5 KVA	D494523-60P
1600 Area Gravel Pit	300 KVA	15573-1
Along highway by runway	25 KVA	68D6282
Power Plant	(1)	W-13
Power Plant	500 KVA	14962-2
Ball Field	25 KVA	3-7327
Building 105	25 KVA	3-3740-0046-4
Sewage Lift Station No.10	15 KVA	S-5700568

* PCB contaminated transformers: 50 ppm <PCB <500 ppm.

(1) Manufacturer's plate missing, KVA unknown.

Source: Air Force Installation Documents.

APPENDIX E

MASTER LIST OF SHOPS

APPENDIX E

MASTER LIST OF SHOPS
WAKE ISLAND AIRFIELD

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Typical TSD Methods
Base Operations Division				
Liquid Fuels Manag.	1509	Yes	Yes	FPTA
Fire Department	1504	Yes	No	Consumed in Process
Dispensary	443	Yes	Yes	Sanitary Sewer, Dump (Burn Area)
Enroute Services/ Flightline	1519	Yes	Yes	Disposed of on Ground, FPTA
Aerospace Ground Equipment (AGE)	1519	Yes	Yes	Disposed of on Ground
Power Production	1190	Yes	Yes	Dust Control, Discharged to Lagoon
Civil Engineering Division				
Carpentry/Utilities Shop	1409	No	No	-
Corrosion Control Shop	1408	Yes	Yes	Scrap Metal Pile/Dump (Burn Area)
Electrical Shop	1422	Yes	Yes	Disposed of on Ground
Entomology Shop	1422	Yes	No	Consumed in Process
Paint Shop	1410	Yes	Yes	Scrap Metal Pile/Dump (Burn Area)
Plumbing Shop	1304	No	No	-

APPENDIX E (Continued)

MASTER LIST OF SHOPS
WAKE ISLAND AIRFIELD

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Typical TSD Methods
Distillation Plant	1306	Yes	Yes	Discharge to Lagoon
Sewage Treatment	1600,1306	Yes	Yes	Sanitary Sewer
Refrigeration/Air Conditioning Shop	1514	Yes	Yes	Dust Control
Welding Shop	1411	No	No	-
Liquid Fuels Maintenance Shop	1511	Yes	Yes	Weathered
Body Repair Shop	1420	No	No	-
<u>Hobby Shops</u>				
Photographic	1185	Yes	Yes	Sanitary Sewer
Ceramic	1187	No	No	-
Auto	Windy Palace	Yes	Yes	Disposed of on Ground
<u>National Weather Bureau</u>				
Hydrogen Generation Plant	102	Yes	Yes	Disposed of on Ground
<u>Transportation Division</u>				
Motor Pool	1403	Yes	Yes	Dust Control
Heavy Equipment Repair	1406	Yes	Yes	Dust Control
Marine Operations	1710,1711	Yes	Yes	Scrap Metal Pile/Dump (Burn Area)

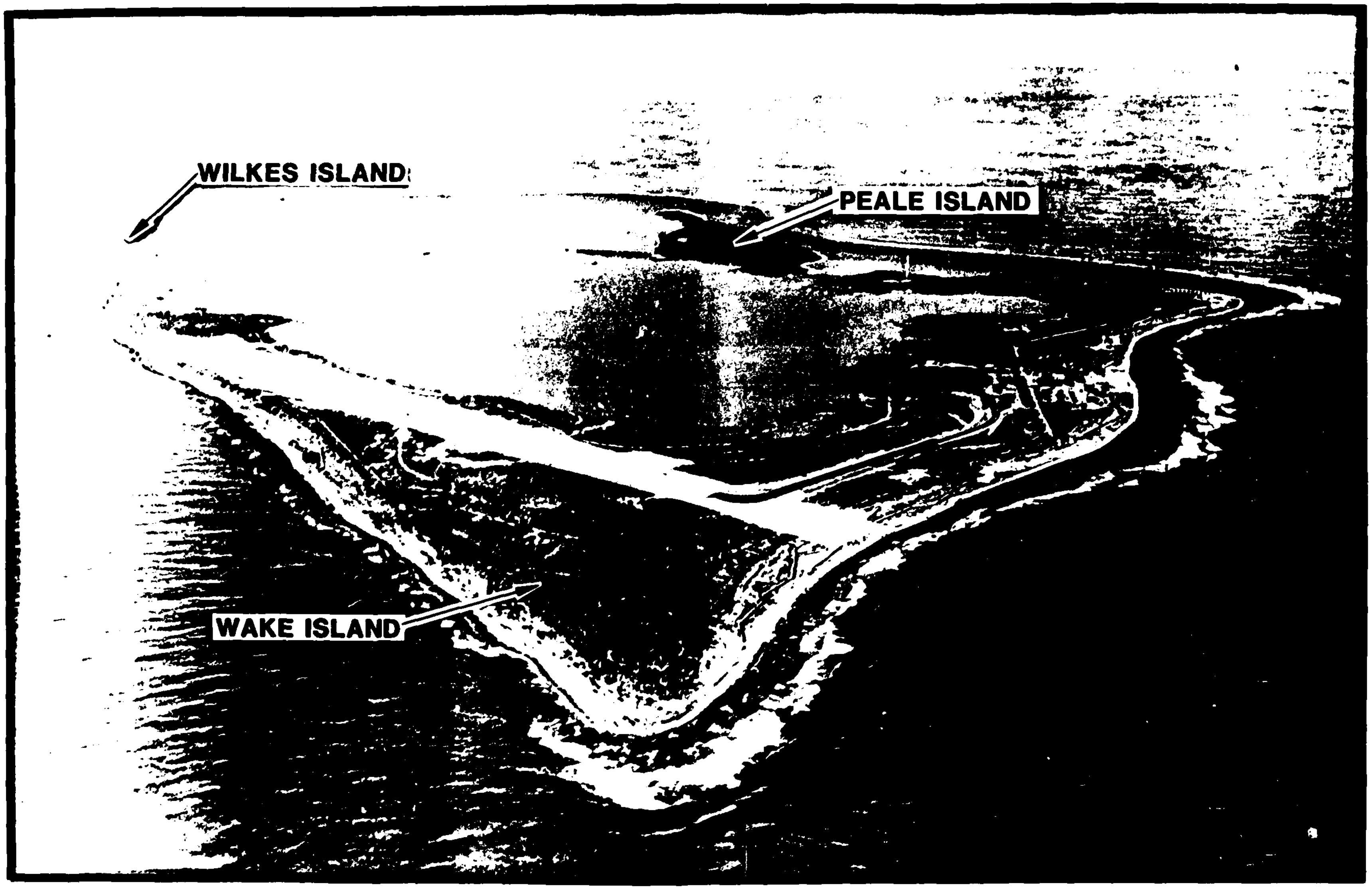
APPENDIX E (Continued)

MASTER LIST OF SHOPS
WAKE ISLAND AIRFIELD

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Typical TSD Methods
Battery Shop	1403	Yes	Yes	Sanitary Sewer, Scrap Metal Pile
Tire Shop	1403	No	No	-
Machine Shop	1403	Yes	No	Consumed in Process

APPENDIX F

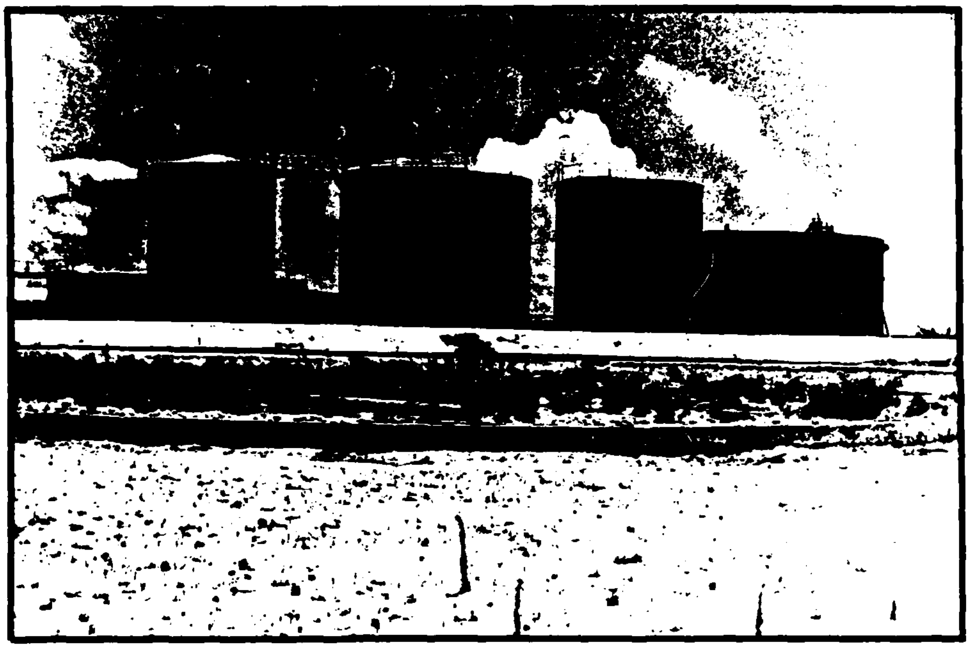
PHOTOGRAPHS



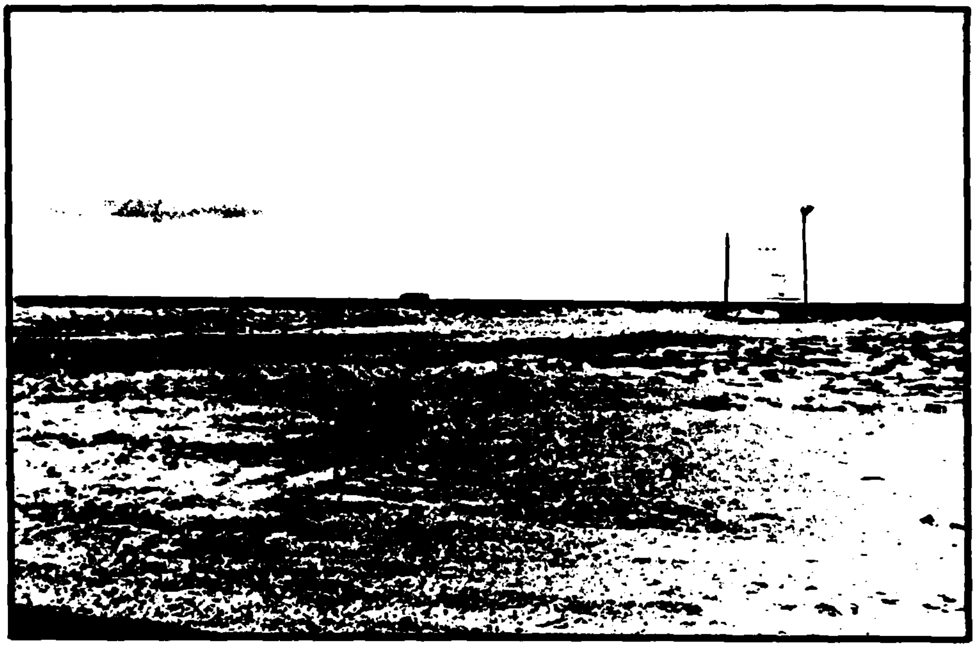
WAKE ISLAND AIRFIELD

JUNE 1950

WAKE ISLAND AIRFIELD



1700 Liquid Fuel Storage Area (1947–Present)
FACING NORTHEAST



1700 Liquid Fuel Storage Area Fuel Port
(1947–Present)
FACING SOUTHEAST

WAKE ISLAND AIRFIELD

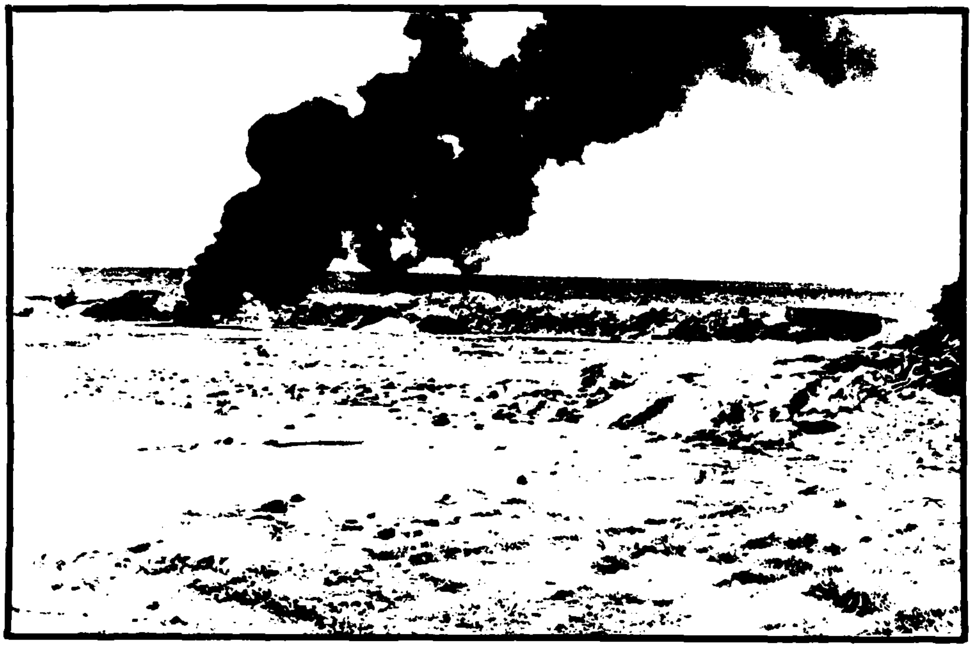
1500 Liquid Fuel Storage Area (1947–Present)
FACING NORTHWEST

1500 Liquid Fuel Storage Area (1947–Present)
FACING SOUTH

Scrap Metal Pile No. 2 (1950's-Present)
FACING SOUTHWEST

Scrap Metal Pile No. 2 (1950's-Present)
FACING SOUTHEAST

WAKE ISLAND AIRFIELD



Burn Area No. 1 (1960's–Present)
FACING SOUTH

Burn Area No. 1 (1960's–Present)
FACING SOUTHWEST

WAKE ISLAND AIRFIELD

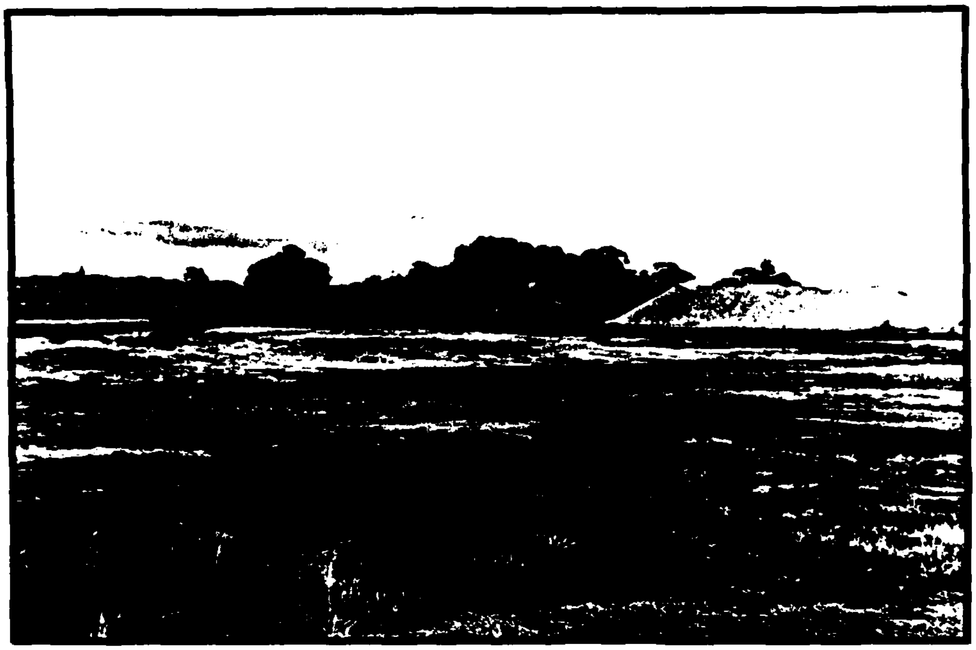
Burn Area No. 2 (1981)
FACING SOUTH

Burn Area No. 2 (1981)
FACING EAST

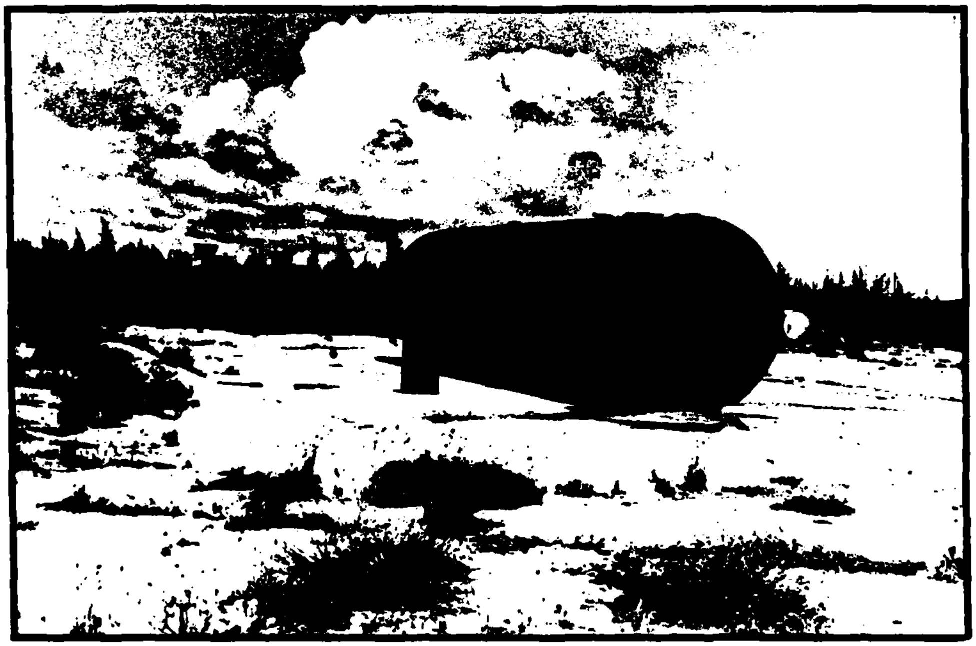
Landfill (1950's–Present)
FACING NORTHEAST

Landfill (1950's–Present)
FACING SOUTHWEST

WAKE ISLAND AIRFIELD



Fire Protection Training Area No. 1 (1947–1979)
FACING SOUTH



Fire Protection Training Area No. 3 (1979–Present)
FACING EAST

APPENDIX G

USAF INSTALLATION RESTORATION PROGRAM
HAZARD ASSESSMENT RATING METHODOLOGY

APPENDIX G

USAF INSTALLATION RESTORATION PROGRAM

HAZARD ASSESSMENT RATING METHODOLOGY

APPENDIX G

USAF INSTALLATION RESTORATION PROGRAM
HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

The Department of Defense (DOD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DOD facilities. One of the actions required under this program is to:

> "develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts." (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

The first site rating model was developed in June 1981 at a meeting with represenatives from USAF Occupational and Environmental Health Laboratory (OEHL), Air Force Engineering and Services Center (AFESC), Engineering-Science (ES) and CH2M Hill. The basis for this model was a system developed for EPA by JRB Associates of McLean, Virginia. The JRB model was modified to meet Air Force needs.

After using this model for 6 months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, on January 26 and 27, 1982, representatives of USAF OEHL, AFESC, various major commands, Engineering-Science, and CH2M Hill met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air Force in setting priorities for follow-on site investigations and confirmation work under Phase II of the IRP.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DOD program needs.

The model uses data readily obtained during the Records Search portion (Phase I) of the IRP. Scoring judgments and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards at the site. This approach meshes well with the policy for evaluating and setting restrictions on excess DOD properties.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: the possible receptors of the contamination, the waste and its characteristics, potential pathways for waste contaminant migration, and any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating.

The receptors category rating is calculated by scoring each factor, multiplying by a factor weighting constant and adding the weighted scores to obtain a total category score.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among three possible routes is used. These routes are surface water migration, flooding, and ground-water migration. Evaluation of each route involves factors associated with the particular migration route. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The scores for each of the three categories are then added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Sites at which there is no containment are not reduced in score. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the scores for the other three categories.

FIGURE 1

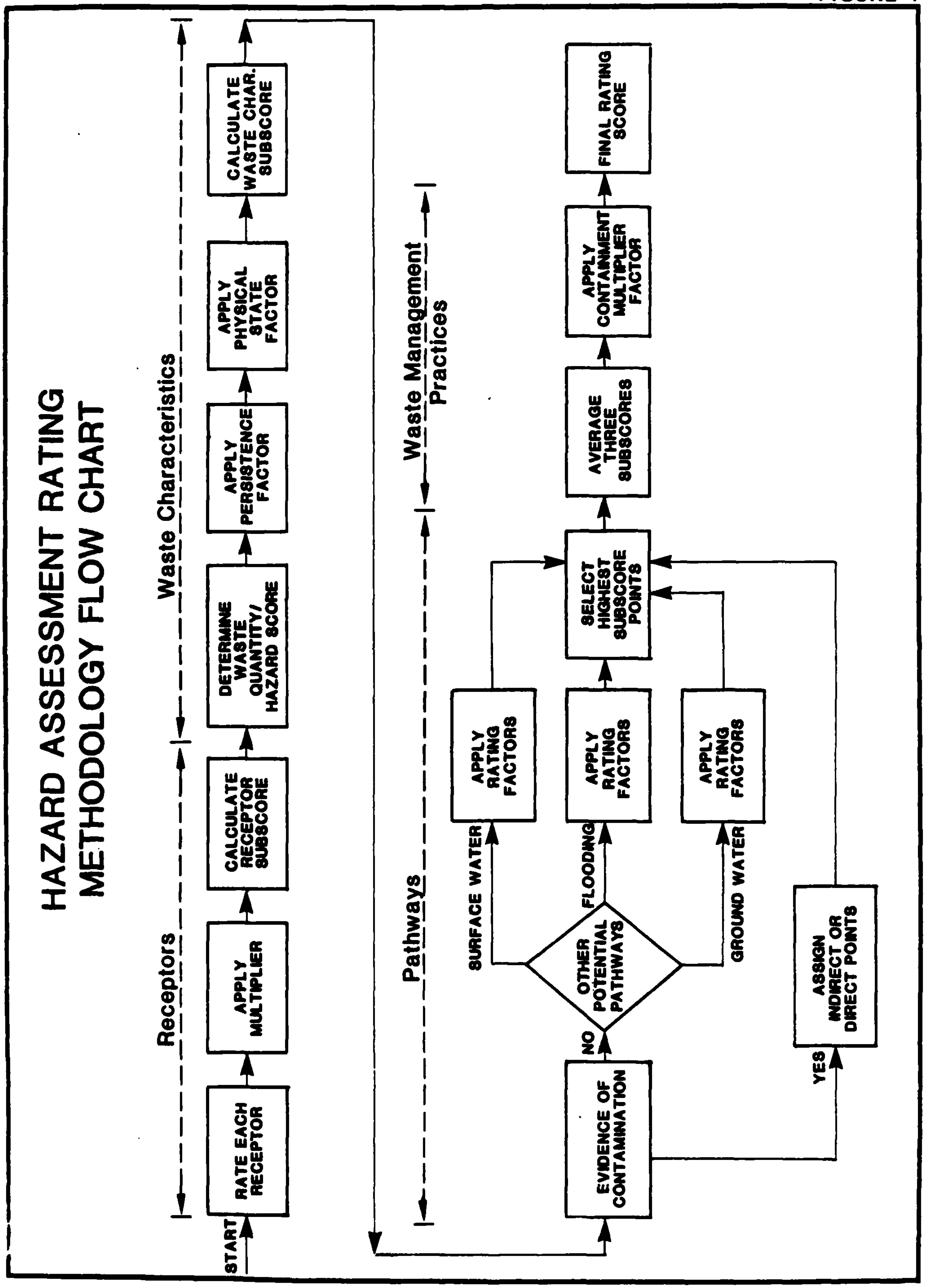

HAZARD ASSESSMENT RATING
METHODOLOGY FLOW CHART
Receptors
Waste Characteristics
START
RATE EACH RECEPTOR
APPLY MULTIPLIER
CALCULATE RECEPTOR SUBSCORE
DETERMINE WASTE QUANTITY/ HAZARD SCORE
APPLY PERSISTENCE FACTOR
APPLY PHYSICAL STATE FACTOR
CALCULATE WASTE CHAR. SUBSCORE
Pathways
Waste Management Practices
EVIDENCE OF CONTAMINATION
NO
YES
OTHER POTENTIAL PATHWAYS
SURFACE WATER
FLOODING
GROUND WATER
APPLY RATING FACTORS
APPLY RATING FACTORS
APPLY RATING FACTORS
ASSIGN INDIRECT OR DIRECT POINTS
SELECT HIGHEST SUBSCORE POINTS
AVERAGE THREE SUBSCORES
APPLY CONTAINMENT MULTIPLIER FACTOR
FINAL RATING SCORE

FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE ____________________

LOCATION ____________________

DATE OF OPERATION OR OCCURRENCE ____________________

OWNER/OPERATOR ____________________

COMMENTS/DESCRIPTION ____________________

SITE RATED BY ____________________

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to reservation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	____	____

Receptors subscore (100 X factor score subtotal/maximum score subtotal) ____

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) ____
2. Confidence level (C = confirmed, S = suspected) ____
3. Hazard rating (H = high, M = medium, L = low) ____

Factor Subscore A (from 20 to 100 based on factor score matrix) ____

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

________ X ________ = ________

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

________ X ________ = ________

FIGURE 2 (Continued)

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		

Subtotals ______ ______

Subscore (100 X factor score subtotal/maximum score subtotal) ______

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
2. Flooding		1		

Subscore (100 x factor score/3) ______

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		

Subtotals ______ ______

Subscore (100 x factor score subtotal/maximum score subtotal) ______

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore ______

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors ______
Waste Characteristics ______
Pathways ______

Total ______ divided by 3 = ______
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

______ X ______ = ______

TABLE 1

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1 - 25	26 - 100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1 mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1 mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination.	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands.	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use.	Recreation, propagation and management of fish and wildlife.	Shellfish propagation and harvesting.	Potable water supplies	6
G. Ground-Water use of uppermost aquifer	Not used, other sources readily available.	Commercial, industrial, or irrigation, very limited other water sources.	Drinking water, municipal water available.	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available.	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1 - 50	51 - 1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1 - 50	51 - 1,000	Greater than 1, 000	6

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (<5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (>20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records.
- o Knowledge of types and quantities of wastes generated by shops and other areas on base.
- o Based on the above, a determination of the types and quantities of waste disposed of at the site.

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records.
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site.

A-3 Hazard Rating

Hazard Category	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS (Continued)

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	M
	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:
Confidence Level
- o Confirmed confidence levels (C) can be added
- o Suspected confidence levels (S) can be added
- o Confirmed confidence levels cannot be added with suspected confidence levels

Waste Hazard Rating
- o Wastes with the same hazard rating can be added
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

Rating Factor	Rating Scale Levels: 0	1	2	3	Multiplier
B-1 POTENTIAL FOR SURFACE WATER CONTAMINATION					
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 in.	-10 to + 5 in.	+5 to +20 in.	Greater than +20 in.	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1 year 24-hr rainfall	<1.0 inch	1.0-2.0 inches	2.1-3.0 inches	>3.0 inches	8
B-2 POTENTIAL FOR FLOODING					
Floodplain	Beyond 100-year floodplain	In 25-year floodplain	In 10-year floodplain	Floods annually	1
B-3 POTENTIAL FOR GROUND-WATER CONTAMINATION					
Depth to ground water	Greater than 500 ft	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings, subsidence fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. WASTE MANAGEMENT PRACTICES FACTOR

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Fire Proection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1 or III-B-3, then leave blank for calculation of factor score and maximum possible score.

APPENDIX H

SITE HAZARD ASSESSMENT RATING FORMS

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Wake Island Airfield - Shop Area
Location: 1400 Area
Date of Operation or Occurrence: 1947 - Present
Owner/Operator: FAA/USAF
Comments/Description: Miscellaneous spills; septic tanks and cesspools used for disposal of oil, solvents, fuel.

Site Rated by: R. M. Palazzolo

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			106	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 59

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) c
3. Hazard rating (1=low, 2=medium, 3=high) h

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x 0.80 = 80

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.00 = 80

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	1	8	8	24
Direct access to ground water	2	8	16	24
Subtotals			90	114
Subscore (100 x factor score subtotal/maximum score subtotal)				79

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 79

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		59
Waste Characteristics		80
Pathways		79
Total	218	divided by 3 = 73 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

73 x 1.00 = 73

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Wake Island Airfield -Installation Road System
Location:
Date of Operation or Occurrence: 1947 - Present
Owner/Operator: FAA/USAF
Comments/Description: Waste oils spread on roads for dust control

Site Rated by: R. M. Palazzolo

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			114	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 63

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) c
3. Hazard rating (1=low, 2=medium, 3=high) h

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x 0.80 = 80

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.00 = 80

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			82	108
Subscore (100 x factor score subtotal/maximum score subtotal)				76
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 76

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		63	
Waste Characteristics		80	
Pathways		76	
Total	219	divided by 3 =	73 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

73 x 1.00 = \ 73 \
FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Wake Island Airfield -1800 Liquid Fuel Storage Area
Location: 1800 Area Wilkes Island
Date of Operation or Occurrence: 1950's - Present
Owner/Operator: USAF
Comments/Description: Sludge pits outside and within dike, fuel spills, etc.

Site Rated by: R. M. Palazzolo

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	2	10	20	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			99	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 55

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) c
3. Hazard rating (1=low, 2=medium, 3=high) h

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x 0.80 = 80

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.00 = 80

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			82	108
Subscore (100 x factor score subtotal/maximum score subtotal)				76
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 76

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		55		
Waste Characteristics		80		
Pathways		76		
Total	211	divided by 3 =	70	Gross total score

B. Apply factor for waste containment from waste management practices.

Gross total score x waste management practices factor = final score

70 x 1.00 = 70 FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Wake Island Airfield -1700 Liquid Fuel Storage Area
Location: 1700 Area
Date of Operation or Occurrence: 1947 - Present
Owner/Operator: Standard Oil Company/USAF
Comments/Description: Fuel leaks, Pipeline washed out, sludge pits

Site Rated by: R. M. Palazzolo

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	2	10	20	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			99	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 55

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) c
3. Hazard rating (1=low, 2=medium, 3=high) h

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x 0.80 = 80

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.00 = 80

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			82	108
Subscore (100 x factor score subtotal/maximum score subtotal)				76
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 76

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		55
Waste Characteristics		80
Pathways		76
Total	211	divided by 3 = 70 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

70 x 1.00 = 70

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Wake Island Airfield -1500 Liquid Fuel Storage Area
Location: 1500 Area
Date of Operation or Occurrence: 1947 - Present
Owner/Operator: FAA/USAF
Comments/Description:

Site Rated by: R. M. Palazzolo

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			102	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 57

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) c
3. Hazard rating (1=low, 2=medium, 3=high) h

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x 0.80 = 80

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.00 = 80

Name of Site: Wake Island Airfield - 1500 Liquid Fuel Storage Area

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			74	108
Subscore (100 x factor score subtotal/maximum score subtotal)				69
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 69

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		57
Waste Characteristics		80
Pathways		69
Total	206	divided by 3 = 69 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

69 x 1.00 = 69

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Wake Island Airfield - Scrape Metal Pile No. 2
Location: Along beach on Southwest side of Wake Island
Date of Operation or Occurrence: 1950 's to Present
Owner/Operator: FAA/USAF
Comments/Description:

Site Rated by: R. M. Palazzolo

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	2	6	12	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			85	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 47

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) c
3. Hazard rating (1=low, 2=medium, 3=high) h

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x 0.80 = 80

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.00 = 80

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			82	108
Subscore (100 x factor score subtotal/maximum score subtotal)				76
2. Flooding	2	1	2	3
Subscore (100 x factor score/3)				67
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 76

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		47
Waste Characteristics		80
Pathways		76
Total	203	divided by 3 = 68 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

68 x 1.00 = 68

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Wake Island Airfield -Filter/Separator No. 6 Leak
Location:
Date of Operation or Occurrence: 1982
Owner/Operator: USAF
Comments/Description: Valve stuck open overnight 7400 gal. JP-5 spilled

Site Rated by: R. M. Palazzolo

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			102	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 57

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) c
3. Hazard rating (1=low, 2=medium, 3=high) h

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x 0.80 = 80

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.00 = 80

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		57
Waste Characteristics		80
Pathways		61
Total	198	divided by 3 = 66 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

66 x 1.00 = 66

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Wake Island Airfield - JP-5 Defuel Line Leak
Location: Under aircraft parking area near 1500 Liquid fuels storage area
Date of Operation or Occurrence: 1983 - 1984
Owner/Operator: USAF
Comments/Description: Valve stuck open overnight 7400 gal. JP-5 spilled

Site Rated by: R. M. Palazzolo

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			99	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 55

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) c
3. Hazard rating (1=low, 2=medium, 3=high) h

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x $0.80 = 80

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x $1.00 = 80

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	3	6	18	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 58

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		55	
Waste Characteristics		80	
Pathways		58	
Total	193 divided by 3 =		64 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

64 x 1.00 = 64

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Wake Island Airfield - Fire Protection Training Area No. 1
Location: Elrod Drive - West of Control Tower (1601)
Date of Operation or Occurrence: 1947 - 1979
Owner/Operator: FAA/USAF
Comments/Description: Burned fuels, waste oils and other combustible shop wastes

Site Rated by: R. M. Palazzolo

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			73	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 41

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) l
2. Confidence level (1=confirmed, 2=suspected) c
3. Hazard rating (1=low, 2=medium, 3=high) h

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x 0.80 = 80

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.00 = 80

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			74	108
Subscore (100 x factor score subtotal/maximum score subtotal)				68.51851
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				57.89473

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 69

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	41	
Waste Characteristics	80	
Pathways	69	
Total 190 divided by 3 =		63 Gross total score

B. Apply factor for waste containment from waste management practices.

Gross total score x waste management practices factor = final score

63 x 1.00 = 63

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Wake Island Airfield -Burn Area (Dump) No. 1
Location: Tip of Peacock Point
Date of Operation or Occurrence: Late 1960's - Present
Owner/Operator: FAA/USAF
Comments/Description:

Site Rated by: R. M. Palazzolo

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			79	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 44

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) s
2. Confidence level (1=confirmed, 2=suspected) c
3. Hazard rating (1=low, 2=medium, 3=high) h

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. *Apply persistence factor*
Factor Subscore A x Persistence Factor = Subscore B

60 x 0.80 = 48

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 1.00 = 48

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			82	108
Subscore (100 x factor score subtotal/maximum score subtotal)				76
2. Flooding	2	1	2	3
Subscore (100 x factor score/3)				67
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 76

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		44
Waste Characteristics		48
Pathways		76
Total	168 divided by 3 =	56 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

56 x 1.00 = 56

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Wake Island Airfield -Burn Area (Dump) No. 2
Location:Point adjacent to Landfill
Date of Operation or Occurrence: 1981
Owner/Operator: USAF
Comments/Description: Temporary rubbish burning area used for 3 months

Site Rated by: R. M. Palazzolo

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			79	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 44

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) s
2. Confidence level (1=confirmed, 2=suspected) c
3. Hazard rating (1=low, 2=medium, 3=high) h

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 0.80 = 48

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 1.00 = 48

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			82	108
Subscore (100 x factor score subtotal/maximum score subtotal)				76
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 76

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		44
Waste Characteristics		48
Pathways		76
Total	168	divided by 3 = 56 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

56 x 1.00 = 56

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Wake Island Airfield -Landfill
Location: Southwest side of Peacock Point
Date of Operation or Occurrence: 1950's to Pesent
Owner/Operator: FAA/USAF
Comments/Description: Landfill receiving primarily wet garbage; but also some shop wastes

Site Rated by: R. M. Palazzolo

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			79	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 44

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) s
2. Confidence level (1=confirmed, 2=suspected) c
3. Hazard rating (1=low, 2=medium, 3=high) h

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 0.80 = 48

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 1.00 = 48

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			82	108
Subscore (100 x factor score subtotal/maximum score subtotal)				76
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 76

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		44	
Waste Characteristics		48	
Pathways		76	
Total	168	divided by 3 =	56 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

56 x 1.00 = 56

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Wake Island Airfield - Aircraft Fuel Leak
Location: Aircraft Parking Area
Date of Operation or Occurrence: 1982
Owner/Operator: USAF
Comments/Description: F-4 fighter leaked 260 gallons of fuel

Site Rated by: R. M. Palazzolo

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			102	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 57

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) s
2. Confidence level (1=confirmed, 2=suspected) c
3. Hazard rating (1=low, 2=medium, 3=high) h

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 0.80 = 48

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 1.00 = 48

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		57
Waste Characteristics		48
Pathways		61
Total	166	divided by 3 = 55 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

55 x 1.00 = \ 55 \
FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Wake Island Airfield - Fire Protection Training Area No. 2
Location: Elrod Drive - West of Revetments
Date of Operation or Occurrence: 1979
Owner/Operator: USAF
Comments/Description: Used for one attempted fire. 200 gallons of JP-4 percolated into the ground

Site Rated by: R. M. Palazzolo

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			73	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 41

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) s
2. Confidence level (1=confirmed, 2=suspected) c
3. Hazard rating (1=low, 2=medium, 3=high) h

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 0.80 = 48

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 1.00 = 48

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			74	108
Subscore (100 x factor score subtotal/maximum score subtotal)				69
2. Flooding	2	1	2	3
Subscore (100 x factor score/3)				67
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 69

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		41	
Waste Characteristics		48	
Pathways		69	
Total	158	divided by 3 =	53 Gross total score

B. Apply factor for waste containment from waste management practices.

Gross total score x waste management practices factor = final score

53 x 1.00 = 53

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Wake Island Airfield -Fire Protection Training Area No. 3
Location: Elrod Drive - west of control tower (1601)
Date of Operation or Occurrence: 1979 - Present
Owner/Operator: USAF
Comments/Description: Burn JP-5

Site Rated by: R. M. Palazzolo

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			73	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 41

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) s
2. Confidence level (1=confirmed, 2=suspected) c
3. Hazard rating (1=low, 2=medium, 3=high) h

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 0.80 = 48

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 1.00 = 48

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			74	108
Subscore (100 x factor score subtotal/maximum score subtotal)				69
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 69

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		41	
Waste Characteristics		48	
Pathways		69	
Total	158	divided by 3 =	53 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

53 x 0.95 = 50

FINAL SCORE

APPENDIX I

GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

APPENDIX I

GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

ABG: Air Base Group

ABW: Air Base Wing

ACFT MAINT: Aircraft Maintenance.

AF: Air Force.

AFB: Air Force Base.

AFESC: Air Force Engineering and Services Center.

AFSCF: Air Force Satellite Control Facility.

AFFF: Aqueous Film Forming Foam, a fire extinquishing agent.

AFR: Air Force Regulation.

AFS: Air Force Station

Ag: Chemical symbol for silver.

AGE: Aerospace Ground Equipment.

Al: Chemical symbol for aluminum.

ALLUVIUM: Materials eroded, transported and deposited by streams.

ALLUVIAL FAN: A fan-shaped deposit formed by a stream either where it issues from a narrow mountain valley into a plain or broad valley, or where a tributary stream joins a main stream.

ANDESITE: A dark colored, fine-grained igneous rock frequently containing conspicuous crystals.

ANTICLINE: A fold in which layered strata are inclined down and away from the axes.

ARTESIAN: Ground water contained under hydrostatic pressure.

AQUICLUDE: Poorly permeable formation that impedes ground-water movement and does not yield to a well or spring.

AQUIFER: A geologic formation, group of formations, or part of a formation that is capable of yielding water to a well or spring.

AQUITARD: A geologic unit which impedes ground-water flow.

AROMATIC: Description of organic chemical compounds in which the carbon atoms are arranged into a ring with special electron stability associated. Aromatic compounds are often more reactive than non-aromatics.

AVGAS: Aviation Gasoline.

Ba: Chemical symbol for barium.

BASALT: A dark commonly extrusive (or locally intrusive, as dikes), fine-grained igneous rock.

BES: Bioenvironmental Engineering Services.

BIOACCUMULATE: Tendency of elements or compounds to accumulate or build up in the tissues of living organisms when they are exposed to these elements in their environments, e.g., heavy metals.

BIODEGRADABLE: The characteristic of a substance to be broken down from complex to simple compounds by microorganisms.

BOS: Base Operating Support.

BOWSER: A portable tank, usually under 200 gallons in capacity.

BX: Base Exchange.

$CaCO_3$: Chemical symbol for calcium carbonate.

CALDERA: A large, basin-shaped volcanic depression in the earth's surface, usually circular.

CAMS: Consolidated Aircraft Maintenance Squadron.

Cd: Chemical symbol for cadmium.

CE: Civil Engineering.

CERCLA: Comprehensive Environmental Response, Compensation and Liability Act.

CES: Civil Engineering Squadron.

CIRCA: About; used to indicate an approximate date.

CLOSURE: The completion of a set of rigidly defined functions for a hazardous waste facility no longer in operation.

CMS: Component Maintenance Squadron.

CN: Chemical symbol for cyanide.

COD: Chemical Oxygen Demand, a measure of the amount of oxygen required to oxidize organic and oxidizable inorganic compounds in water.

COE: Corps of Engineers.

COLLUVIUM: Sediments that have moved down slope primarily under the influence of gravity or as periodic, unchannelized flow. It frequently includes large boulders or other fragments which contrast this material to alluvium, material deposited by channelized flow which results in some degree of sorting according to particle size.

CONFINED AQUIFER: An aquifer bounded above and below by impermeable strata or by geologic units of distinctly lower permeability than that of the aquifer itself.

CONFINING UNIT: An aquitard or other poorly permeable layer which restricts the movement of ground water.

CONTAMINATION: The degradation of natural water quality to the extent that its usefulness is impaired; there is no implication of any specific limits since the degree of permissible contamination depends upon the intended end use or uses of the water.

Cr: Chemical symbol for chromium.

Cu: Chemical symbol for copper.

DET: Detachment.

2,4-D: Abbreviation for 2,4-dichlorophenoxyacetic acid, a common weed killer and defoliant.

DIP: The angle at which a stratum is inclined from the horizontal.

DISPOSAL FACILITY: A facility or part of a facility at which hazardous waste is intentionally placed into or on land or water, and at which waste will remain after closure.

DISPOSAL OF HAZARDOUS WASTE: The discharge, deposit, injection, dumping, spilling, or placing of any hazardous waste into or on land or water so that such waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground water.

DOD: Department of Defense.

DOWNGRADIENT: In the direction of decreasing hydraulic static head; the direction in which ground water flows.

DPDO: Defense Property Disposal Office, previously included Redistribution and Marketing (R&M) and Salvage.

DUMP: An uncovered land disposal site where solid and/or liquid wastes are deposited with little or no regard for pollution control or aesthetics; dumps are susceptible to open burning and are exposed to the elements, disease vectors and scavengers.

EFFLUENT: A liquid waste discharge from a manufacturing or treatment process, in its natural state, or partially or completely treated, that discharges into the environment.

EP: Extraction Procedure, the EPA's standard laboratory procedure for leachate generation.

EPA: U.S. Environmental Protection Agency.

EPHEMERAL: Short-lived or temporary.

EPHEMERAL AQUIFER: A water-bearing zone typically located near the surface which normally contains water seasonally.

EROSION: The wearing away of land surface by wind, water, or chemical processes.

ES: Engineering-Science, Inc.

FAA: Federal Aviation Administration.

FACILITY: Any land and appurtenances thereon and thereto used for the treatment, storage and/or disposal of hazardous wastes.

FAULT: A fracture in rock along which the adjacent rock surfaces are differentially displaced.

Fe: Chemical symbol for iron.

FLOOD PLAIN: The lowland and relatively flat areas adjoining inland and coastal areas of the mainland and off-shore islands, including, at a minimum, areas subject to a one percent or greater chance of flooding in any given year.

FLOW PATH: The direction or movement of ground water as governed principally by the hydraulic gradient.

FMS: Field Maintenance Squadron.

FPTA: Fire Protection Training Area.

GC/MS: Gas chromatograph/mass spectrophotometer, a laboratory procedure for identifying unknown organic compounds.

GROUND WATER: Water beneath the land surface in the saturated zone that is under atmospheric or artesian pressure.

GROUND WATER RESERVOIR: The earth materials and the intervening open spaces that contain ground water.

HALOGEN: The class of chemical elements including fluorine, chlorine, bromine, and iodine.

HARDFILL: Disposal sites receiving construction debris, wood, miscellaneous spoil material.

HARM: Hazard Assessment Rating Methodology.

*HAZARDOUS SUBSTANCE: Under CERCLA, the definition of hazardous substance includes:

1. All substances regulated under Paragraphs 311 and 307 of the Clean Water Act (except oil);

2. All substances regulated under Paragraph 3001 of the Solid Waste Disposal Act;

3. All substances regulated under Paragraph 112 of the Clean Air Act;

4. All substances which the Administrator of EPA has acted against under Paragraph 7 of the Toxic Substance Control Act;

5. Additional substances designated under Paragraph 102 of the Superfund bill.

*HAZARDOUS WASTE: As defined in RCRA, a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

HAZARDOUS WASTE GENERATION: The act or process of producing a hazardous waste.

HEAVY METALS: Metallic elements, including the transition series, which include many elements required for plant and animal nutrition in trace concentrations but which become toxic at higher concentrations.

Hg: Chemical symbol for mercury.

HQ: Headquarters.

HWMF: Hazardous Waste Management Facility.

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*For purposes of this Phase I IRP report hazardous substances and hazardous wastes are considered synonymous.

HYDROCARBONS: Organic chemical compounds composed of hydrogen and carbon atoms chemically bonded. Hydrocarbons may be straight chain, cyclic, branched chain, aromatic, or polycyclic, depending upon arrangement of carbon atoms. Halogenated hydrocarbons are hydrocarbons in which one or more hydrogen atoms has been replaced by a halogen atom.

INCOMPATIBLE WASTE: A waste unsuitable for comingling with another waste or material because the comingling might result in generation of extreme heat or pressure, explosion or violent reaction, fire, formation of substances which are shock sensitive, friction sensitive, or otherwise have the potential for reacting violently, formation of toxic dusts, mists, fumes, and gases, volatilization of ignitable or toxic chemicals due to heat generation in such a manner that the likelihood of contamination of ground water or escape of the substance into the environment is increased, any other reaction which might result in not meeting the air, human health, and environmental standards (CFR 264.17 and 265.17).

INFILTRATION: The movement of water through the soil surface into the ground.

IRP: Installation Restoration Program.

IS: Island.

ISOPACH: Graphic presentation of geologic data, including lines of equal unit thickness that may be based on confirmed (drill hole) data or indirect geophysical measurement.

Jet A-1: Commercial jet fuel.

JP-4: Jet Propulsion Fuel Number Four, military jet fuel.

JP-5: Jet Propulsion Fuel Number Five, military jet fuel.

LEACHATE: A solution resulting from the separation or dissolving of soluble or particulate constituents from solid waste or other man-placed medium by percolation of water.

LEACHING: The process by which soluble materials in the soil, such as nutrients, pesticide chemicals or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water.

LENTICULAR: A bed or rock stratum or body that is lens-shaped.

LINER: A continous layer of natural or man-made materials beneath or on the sides of a surface impoundment, landfill, or landfill cell which restricts the downward or lateral escape of hazardous waste, hazardous waste constituents or leachate.

LITHOLOGY: The description of the physical character of a rock.

LOESS: An essentially unconsolidated unstratified calcareous silt; commonly homogeneous, permeable and buff to gray in color.

LOX: Liquid oxygen.

LYSIMETER: A vacuum operated sampling device used for extracting pore water samples at various depths within the unsaturated zone.

MAC: Military Airlift Command.

METALS: See "Heavy Metals".

MGD: Million gallons per day.

MOA: Military Operating Area.

MOGAS: Motor gasoline.

Mn: Chemical symbol for manganese.

MODIFIED MERCALLI INTENSITY: A number describing the effects of an earthquake on man, structures and the earth's surface. A Modified Mercalli Intensity of I is not felt. An intensity of VI is felt indoors and outdoors and for an intensity of VII it becomes difficult for a man to remain standing. Intensities of IX to XII involve increasing levels of destruction with destruction being nearly total at an intensity of XII.

MONITORING WELL: A well used to measure ground-water levels and to obtain samples.

MOTU: Island.

MSL: Mean Sea Level.

MWR: Morale, Welfare and Recreation.

NCO: Non-commissioned Officer.

NCOIC: Non-commissioned Officer In-Charge.

NET PRECIPITATION: The amount of annual precipitation minus annual evaporation.

NGVD: National Geodetic Vertical Datum of 1929.

Ni: Chemical symbol for nickel.

NOAA: National Oceanic and Atmospheric Administration.

OEHL: Occupational and Environmental Health Laboratory.

OIC: Officer-In-Charge.

OMS: Organizational Maintenance Squadron.

ORGANIC: Being, containing or relating to carbon compounds, especially in which hydrogen is attached to carbon.

OSI: Office of Special Investigations.

O&G: Symbols for oil and grease.

PACAF: Pacific Air Forces.

PACOM: Pacific Command.

PAHOEHOE: A type of lava flow having a smooth, glassy, billowy or undulating surface.

Pb: Chemical symbol for lead.

PCB: Polychlorinated biphenyl; liquids used as a dielectric in electrical equipment.

PD-680: Stoddard solvent, dry cleaning solvent.

PERCHED WATER TABLE: A water table above a relatively impermeable zone underlain by unsaturated rocks of sufficient permeability to allow ground-water movement.

PERCOLATION: Movement of moisture by gravity or hydrostatic pressure through interstices of unsaturated rock or soil.

PERMEABILITY: The capacity of a porous rock, soil or sediment for transmitting a fluid without damage to the structure of the medium.

PERSISTENCE: As applied to chemicals, those which are very stable and remain in the environment in their original form for an extended period of time.

PESTICIDE: An agent used to destroy pests. Pesticides include such specialty groups as herbicides, fungicides, insecticides, etc.

pH: Negative logarithm of hydrogen ion concentration with the range 1 to 7 as acidic and 7 to 14 as basic.

PL: Public Law.

POL: Petroleum, Oils and Lubricants.

POLLUTANT: Any introduced gas, liquid or solid that makes a resource unfit for a specific purpose.

POLYCYCLIC COMPOUND: All compounds in which carbon atoms are arranged into two or more rings, usually aromatic in nature.

POTENTIALLY ACTIVE FAULT: A fault along which movement has occurred within the last 25-million years.

POTENTIOMETRIC SURFACE: The imaginery surface to which water in an artesian aquifer would rise in tightly screened wells penetrating it.

PPB: Parts per billion by weight.

PPM: Parts per million by weight.

PRECIPITATION: Rainfall and snowfall.

PT: Point.

QAE: Quality Assurance Evaluator.

QUATERNARY MATERIALS: The second period of the Cenozoic geologic era, following the Tertiary, and including the last 2-3 million years.

RCRA: Resource Conservation and Recovery Act.

RECEPTORS: The potential impact group or resource for a waste contamination source.

RECHARGE AREA: A surface area in which surface water or precipitation percolates through the unsaturated zone and eventually reaches the zone of saturation. Recharge areas may be natural or manmade.

RECHARGE: The addition of water to the ground-water system by natural or artificial processes.

RECON: Reconnaissance.

RIPARIAN: Living or located on a riverbank.

RM: Resource Management.

SANITARY LANDFILL: A land disposal site using an engineered method of disposing solid wastes on land in a way that minimizes environmental hazards.

SAPROLITE: A residual soil retaining the physical appearance or former structure of the parent rock.

SATURATED ZONE: That part of the earth's crust in which all voids are filled with water.

SAX'S TOXICITY: A rating method for evaluating the toxicity of chemical materials as presented in a handbook by Sax.

SCS: U.S. Department of Agriculture Soil Conservation Service.

SEISMICITY: Pertaining to earthquakes or earth vibrations.

SLUDGE: The solid residue resulting from a manufacturing or wastewater treatment process which also produces a liquid stream. Also, the residue which accumulates in fuel tanks.

SOLID WASTE: Any garbage, refuse, or sludge from a waste treatment plant, water supply treatment, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, or agricultural operations and from community activities, but does not include solid or dissolved materials in domestic sewage; solid or dissolved materials in irrigation return flows; industrial discharges which are point source subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 USC 880); or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (68 USC 923).

SP: Spill area.

SPILL: Any unplanned release or discharge of a hazardous waste onto or into the air, land, or water.

STORAGE OF HAZARDOUS WASTE: Containment, either on a temporary basis or for a longer period, in such a manner as not to constitute disposal of such hazardous waste.

STP: Sewage Treatment Plant.

STS: Satellite Tracking Station.

TAC: Tactical Air Command

TCB: Abbreviation for tricresyl phosphate.

TCE: Trichloroethylene, a solvent and suspected carcinogen.

2,4,5-T: Abbreviation for 2,4,5-trichlorophenoxyacetic acid, a common herbicide.

TDS: Total Dissolved Solids.

TOC: Total Organic Carbon.

TOXICITY: The ability of a material to produce injury or disease upon exposure, ingestion, inhalation, or assimilation by a living organism.

TRANSMISSIVITY: The rate at which water is transmitted through a unit width of aquifer under a unit hydraulic gradient.

TREATMENT OF HAZARDOUS WASTE: Any method, technique, or process including neutralization designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize the waste or so as to render the waste nonhazardous.

TSD: Treatment, storage or disposal.

UNCONFORMITY: A substantial break or gap in the geologic record, usually the result of a prolonged erosional period prior to the deposition of the succeeding layer in the stratigraphic column. It may be recognized by the fact that an overlying stratum does not correspond to the next or following age in geologic history.

UPGRADIENT: In the direction of increasing hydraulic static head; the direction opposite to the prevailing flow of groundwater.

USAF: United States Air Force.

USAFSS: United States Air Force Security Service.

USDA: United States Department of Agriculture.

USFWS: United States Fish and Wildlife Service.

USGS: United States Geological Survey.

USMC: United States Marine Corps.

USN: United States Navy.

VESICULAR: Refers to the texture of a rock, especially lava, which may have abundant cavities of variable shape and size formed by the entrapment of expanding gas during the solidification of the material.

WATER TABLE: Surface of a body of unconfined ground water at which the pressure is equal to that of the atmosphere.

WWTP: Wastewater Treatment Plant.

Zn: Chemical symbol for zinc.

APPENDIX J

REFERENCES

REFERENCES

1. JHM LTD, 1984. Inspection Report (Leak Detection in Underground Fuel Pipelines).

APPENDIX K

INDEX OF REFERENCES TO POTENTIAL CONTAMINATION SITES AT WAKE ISLAND AIRFIELD

APPENDIX K

INDEX OF SITES
WITH POTENTIAL FOR ENVIRONMENTAL CONTAMINATION

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Shop Area	4, 5, 7, 4-17, 4-24, 4-28, 5-1, 5-2, 6-2, 6-4, 6-10
Installation Road System	4, 5, 7, 4-22, 4-25, 4-28, 5-1, 5-2, 6-2, 6-5, 6-10
1800 Liquid Fuel Storage Area	4, 5, 7, 4-11, 4-17, 4-24, 4-28, 5-2, 5-3, 6-2, 6-5, 6-10
1700 Liquid Fuel Storage Area	4, 5, 7, 4-11, 4-13, 4-17, 4-24, 4-24, 5-2, 5-3, 6-2, 6-7, 6-10
1500 Liquid Fuel Storage Area	4, 5, 8, 4-11, 4-17, 4-24, 4-28, 5-2, 5-3, 6-3, 6-7, 6-10
Scrap Metal Pile No. 2	4, 5, 8, 4-21, 4-25, 4-28, 5-2, 5-4, 6-3, 6-8, 6-10
Filter/Separator No. 6 Leak	4, 5, 8, 4-13, 4-24, 4-28, 5-2, 5-4, 6-3, 6-7, 6-10
JP-5 Defuel Line Leak	4, 5, 8, 4-13, 4-24, 4-28, 5-2, 5-4, 6-3, 6-7, 6-10
Fire Protection Training Area No. 1	4, 5, 8, 4-18, 4-24, 4-28, 5-2, 5-4, 6-3, 6-8, 6-10
Burn Area (Dump) No. 1	4, 5, 8, 4-21, 4-25, 4-28, 5-2, 5-5, 6-3, 6-8, 6-10
Burn Area (Dump) No. 2	4, 5, 8, 4-21, 4-25, 4-28, 5-2, 5-5, 6-3, 6-8, 6-10
Landfill	4, 5, 8, 4-20, 4-24, 4-28, 5-2, 5-5, 6-3, 6-8, 6-10
Aircraft Fuel Spill	4, 5, 4-13, 4-24, 4-28, 5-2, 5-5
Fire Protection Training Area No. 2	4, 5, 4-18, 4-24, 4-28, 5-2, 5-6
Fire Protection Training Area No. 3	4, 5, 4-18, 4-24, 4-28, 5-2, 5-6